North Moor and Salt Moor Water Level Management Plan

Parrett Internal Drainage Board

Approved July 2010

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1. Approval of the Water Level Management Plan

This Water Level Management Plan has been prepared by the Parrett Internal Drainage Board for the North Moor and Salt Moor area of the Drainage Board District. Contributions to the WLMP have been received from the Environment Agency, Natural England and others.

Water Level Management Plan – General details	
Plan area	North Moor and Salt Moor (Parrett IDB)
SSSI(s) covered	North Moor SSSI
Region / Area	Somerset Levels and Moors
IDB Lead officer	Philip Brewin, Ecologist

Approval of the Water Level Management Plan			
"I agree with the proposals and actions set out in this Water Level Management Plan and confirm the Plan will help achieve favourable condition for the Sites of Special Scientific Interest covered by the Plan."			
Position & Organisation	**Name**	**Signature**	**Date**
Chairman – Parrett Drainage Board	Peter Maltby		
Area Manager – Environment Agency	Nick Gupta		
Area Manager – Natural England	Mark Watson		

2. Introduction

2.1. Purpose of the Plan

Water Level Management Plans (WLMPs) are required for all areas which have a conservation interest and where water level management is important for the maintenance, or rehabilitation, of that interest (e.g. Sites of Special Scientific Interest (SSSIs), Special Protection Areas and Ramsar sites). WLMPs also provide a framework for balancing and integrating the water level requirements of agriculture, recreation, flood risk and conservation within an area.

Natural England is responsible for assessing the condition of SSSIs and has identified a number of wetland SSSIs in Somerset where changes in water level management are required to achieve favourable condition for each site (see Box 2). One of these sites is within the area covered by this Plan:

- North Moor SSSI (676.3ha), with 34% of the area being in an unfavourable condition, which in some areas, is due to inappropriate water management.

The activities of the Parrett IDB play an important role in maintaining a healthy natural environment in Somerset and the IDB acknowledges its statutory duties to nature conservation under the Land Drainage Act (1991), the Conservation (Natural Habitats etc) Regulations (1994), the Countryside and Rights of Way Act (2000) and the Natural England and Rural Communities Act (2006). This WLMP will assist the Parrett IDB in carrying out its nature conservation duties and help provide appropriate water level management required to achieve favourable condition for the North Moor SSSI. It will also help ensure effective management measures are in place to resolve problems and protect and sustain valued features of the area.

2.2. Plan area

The Plan covers 3970 acres (1613 hectares) of the former North Moor Drainage Board District that now forms part of the area managed by the Parrett IDB. The location and extent of the Plan area is shown on Map 1.

The Plan area is bounded on the north east by the River Parrett, on the north west by the higher ground around Huntworth and North Newton, on the south west by the higher ground around the village of Lyng and to the south east by the River Tone.

An operational railway line runs through the western side of the Plan area and a disused railway line runs through the south west corner of the area. The Bridgwater and Taunton Canal runs along the western edge of the Plan area. The A361 runs along part of the southern boundary of the Plan area.

2.3. Responsibility for preparation and implementation of the Plan

The Parrett IDB is responsible for the preparation, overall monitoring and review of this WLMP on behalf of the Drainage Authorities operating in the area, namely the Parrett IDB, the Environment Agency, Somerset County Council, Taunton Deane Borough Council and Sedgemoor District Council. Each Drainage Authority has contributed information to enable the WLMP to be produced by the Parrett IDB. The end result is a collaborative effort by all the Drainage Authorities. Each Drainage Authority is responsible for implementing and monitoring their own actions within the WLMP, and for reporting to the Parrett IDB as appropriate.

The Parrett IDB will adopt and implement the WLMP in accordance with the criteria set out in Box 1.

Box 1: The approval and implementation of Water Level Management Plans

The following criteria will be used by the Parrett IDB when considering WLMPs for approval and when implementing actions relating to:

a. Making recommendations regarding the approval of a WLMP as a plan of action;
b. The construction of a capital improvement scheme as proposed within the approved WLMP;
c. Changing water levels as proposed within the approved WLMP.

A. Continuation of existing good practices

Where the WLMP includes proposals to '*continue the current good practices regarding water level management, watercourse maintenance and operational procedures'*, the Parrett IDB will satisfy itself that the current practices:

- Are technically sound;
- Satisfies the drainage and water level management needs of the area;
- Are environmentally sound;
- Are within the financial capacity of the Board to achieve;
- Will fulfil all the legal obligations of the Board, including those related to achieving favourable condition and biodiversity.

B. Undertake a capital improvement scheme

Where the WLMP includes a '*proposal to carry out a capital improvement scheme'*, the Parrett IDB will satisfy itself that the proposed scheme:

- Is technically sound;
- Satisfies the drainage and water level management needs of the area;
- Is environmentally sound;
- Is within the financial capacity of the Board to achieve;
- Has been agreed in principle with the occupier(s) and owner(s) of the land where the capital scheme is to be built;
- Is within the legal power of the Board to implement.

C. Change water level management

Where the WLMP includes proposal is to '*change the water level management, watercourse maintenance or operational procedures'*, the Parrett IDB will satisfy itself that the proposed change:

- Is technically sound;
- Satisfies the drainage and water level management needs of the area;
- Is environmentally sound;
- Is within the financial capacity of the Board to achieve;
- Is supported by the owners and occupiers of a significant majority of the land that would be affected by the proposed change being considered (see note below);
- Will fulfil all the legal obligations of the Board, including those related to achieving favourable condition and biodiversity;
- Does not carry a significant risk that the Board may face a legal claim for damages incurred by a third party as a consequence of its decision to change its current practice.

Notes: When considering a proposal to change water levels, the Parrett IDB will use the uptake of agri-environment scheme agreements (including proposals by the occupiers to upgrade their agreements), in the area likely to be affected by the proposed change, as an initial indication of the measure of compatibility of the farm holding/land management unit with the proposed change in water levels. Actual changes in water levels thereafter will be sought through the negotiation of appropriate land management agreements between the owners/occupiers of the land and the relevant authority (i.e. Higher Level Stewardship agreements between farmers and Natural England).

2.4. Consultation and Plan approval

The First Draft of the WLMP was considered by the Parrett IDB's WLMP Committee in May 2010 and endorsed for purposes of consultation with drainage ratepayers, Statutory Bodies and other organisations. Consultation on the WLMP took place during a four week period in May and June 2010.

Consultation responses, and any amendments to the WLMP arising from the consultation, were considered by the Parrett IDB WLMP Committee before recommending the WLMP for approval by the Full Parrett Board in July 2010.

3. Hydrology, watercourses and infrastructure

3.1. Topography and soils

The land drained by the watercourses is low lying alluvium with surface peat bordering the left bank of the tidal River Parrett. The land surface varies from 8 metres above Ordnance Datum Newlyn (ODN) near the river to 4m ODN further inland. High tides are prevented from inundating the low lying land by tidal embankments along the left bank of the River Parrett with crest levels between 8m and about 9m ODN.

3.2. Water supply

The mean annual rainfall between 1999 and 2007 for the Plan area was 675mm. This figure was been calculated using three Environment Agency observer rain gauges located at Bere, Westonzoyland and Middlezoy.

Water is supplied to the Plan area by Park Brook and the Kingscliffe Stream to the west and from Curry Moor to the south via the North Moor and the Salt Moor Inlets at Baltmoor Wall. In exceptional floods, water may overflow from Curry Moor into both North Moor and Salt Moor. North Moor Pumping Station and Salt Moor Pumping Station are the principal water level control structures for the Plan area and are also the key flood evacuation points. There are also many smaller water control structures within the Plan area that are used to manage water levels throughout the year.

Water management in the summer is mostly focused on the supply of water to the rhyne and ditch system and the maintenance of high ditch water levels for farming and conservation, except during periods of heavy rainfall when there is a risk of flooding. From early April to the end of November, sluice gates and penning boards are operated to raise water levels in the rhynes and ditches to summer pen levels. The maintenance of summer levels is required to:

a) Provide wet fences around the fields and the watering of livestock;

b) Maintain an appropriate groundwater table during the growing season;

c) Maintain the conservation interest of the watercourses.

Details of the water supply inlets to the Plan area are given in Section 3.7.1 and the locations of structures are shown on Map 3.

3.3. Drainage

The principal outlet for water from the Plan area is to the River Parrett via either the North Moor Pumping Station or the Salt Moor Pumping Station. It is also possible to discharge water from

the Plan area into the River Parrett via four gravity outfalls: Elson's Clyse Outfall, Lane End Farm Outfall, New House Farm Outfall and the gravity outfall at North Moor Pumping Station, although this is currently out of operation.

Water levels are generally lowered in winter to allow better drainage and to reduce the risk of overland flooding. However, most watercourses retain a pen level in winter to maintain the conservation interests and to reduce frost damage and the erosion of banks.

3.4. Asset management systems

The Environment Agency manages its assets using a Flood Risk Management (FRM) system approach. A FRM system is defined as "*a group of assets that work together to reduce the flood risk to the people, infrastructure and environment within the system*". Each system has its own specific Management Plan.

Performance specifications are given to each system to guide maintenance standards. The maintenance works are then carried out by the Environment Agency's Operations Delivery Team. This process is used to direct the highest standards of maintenance to where they are needed most (i.e. people, property and environment) using a risk based approach. The Environment Agency has adopted three categories to prioritise maintenance for each FRM system:

- **High** – Generally urban areas with high populations or rural areas with high environmental designations.
- **Medium** – Urban to rural areas with relatively low population densities.
- **Low** – Sparsely populated areas and agricultural land.

The FRM system that covers the whole the North Moor and Salt Moor WLMP area is:

- **FR14S029 Curry/Hay/Salt/North Moors (High)**

The Curry/Hay/Salt/North Moors FRM system has been categorised as a high priority system because of the high environmental designations of the adjoining land and the importance of water management to these environmental assets.

Each Environment Agency maintained asset is listed in the National Flood and Coastal Defence Database (NFCDD). This provides a definitive store for all data on flood and coastal defences. It records inspections, identifies asset condition, residual life and recommends any works required and their urgency.

The Parrett IDB manages its assets in the Plan area under a comparable asset management system.

3.5. The strategic context for water management

There are a number of strategic plans and documents which provide the context for this Water Level Management Plan, including:

- *The Catchment Flood Management Plan* - A summary version is available on the Environment Agency website.
- *Catchment Abstraction Management Strategies (CAMS)* - These documents are currently being revised for re-release in 2011.
- *Lower Parrett & Tone Flood Management Strategy* - Working Draft prepared in February 2005.
- *Parrett and Tone Channel Monitoring Project 2008-09.*
- *Water Framework Directive* and *South West River Basin Management Plan* - The plan is available on the Environment Agency website.

3.5.1. Catchment Flood Management Plan

The Catchment Flood Management Plan (CFMP) for the River Parrett provides an overview of flood risk management in the catchment for the next 100 years. The CFMP is intended to guide Flood Risk Management (FRM) investment in the catchment by the Environment Agency and other bodies with FRM responsibilities and powers. The CFMP was produced in 2008 and will be reviewed every six years.

The Environment Agency proposes to adopt Policy Option 6 for the floodplains of the Parrett catchment. This would involve the Environment Agency, and others, taking action to increase the frequency of flooding to deliver benefits locally and elsewhere. It appears that by redistributing floodwater - primarily from upstream of Langport to the King's Sedgemoor Drain, the overall damage and disruption from flooding will be reduced. Work will also be required to maintain the safety of the existing embankments and infrastructure.

3.5.2. Catchment Abstraction Management Strategy

The Environment Agency has developed Catchment Abstraction Management Strategies (CAMS) to assess the water availability in catchments and to ensure water resources are managed sustainably. As the Levels and Moors are penned systems, the current Strategy for the Parrett catchment (published March 2006) was unable to accurately assess the water requirements for these areas, and therefore the availability of water for abstraction. To address this problem the Environment Agency is preparing a new CAMS for the Levels and Moors, which is due for completion by February 2011. The aim of the new Strategy will be to identify what water may be available for abstraction and set an appropriate abstraction licensing policy for those rivers that are influenced by the inlets and outlets from penned systems. The new CAMS will not seek to change the water levels within penned systems, and will assume that the water levels stated in the WLMPs are appropriate. If the CAMS identifies that there is surplus water available in the catchment, then it will also consider how much of this water is available for new abstraction licences. Where over abstraction is identified it will consider what actions are necessary to redress the balance.

3.5.3. Lower Parrett & Tone Flood Management Strategy

This draft report looks at the long term flood management of the River Parrett and the River Tone downstream of Taunton and Langport. The strategic aim is to achieve sustainable flood management within the area, minimise the impact on communities and maximise opportunities for wildlife and other local interests. Most of the area has a significant risk of flooding from either fluvial and / or tidal sources. Embankments provide most of the flood protection in the area and there is an increasing risk of breaching due to bank condition and climate change. Various options have been recommended for further study.

3.5.4. Parrett and Tone Channel Monitoring Project

The Environment Agency is currently undertaking a study on the River Parrett and River Tone to monitor and assess the success of dredging work that was carried out between 2002 and 2005. The study area on the Tone is from the Parrett confluence to New Bridge and on the Parrett from Oath Lock downstream to the M5 flyover. New bathymetric surveys will be undertaken to gauge the current profile of the river channels. This data will then be meshed together with LiDAR data in order to obtain accurate cross sections. Once these cross sections are in place, the Environment Agency intends to reuse the existing Parrett / Sowy hydraulic model to replicate the current profile of the Parrett and Tone. The Environment Agency will then model alternative scenarios to determine the need for a programme of de-silting that maximises flood alleviation and optimises the performance and sustainability of the channels.

3.6. Watercourses

3.6.1. Main Rivers

The Environment Agency has permissive powers to manage designated Main Rivers to reduce the risk of flooding property and the risk to human life. There are two Main Rivers in the Plan area; North Moor Main Drain and Salt Moor Main Drain, and two Main Rivers on the boundary of the Plan area; the River Parrett and the River Tone.

The North Moor Main Drain flows through the centre of the Plan area, from south to north, until it joins the left bank of the Parrett at North Moor Pumping Station. The Salt Moor Main Drain flows through the south eastern part of the Plan area to Salt Moor Pumping Station on the left bank of the River Parrett. The River Parrett forms the north eastern boundary of the Plan area and is tidal along this reach. The River Tone forms part of the southerly boundary of the Plan area and is tidal along this reach. Summary details of these watercourses are set out in Table 1. The locations of the Main Rivers are shown on Map 2. The control structures on these watercourses are listed in Tables 2 – 4.

3.6.2. IDB watercourses

The Parrett IDB is responsible for maintaining a network of arterial watercourses in the Plan area known as ‘Viewed Rhynes’. Watercourses can be taken into, or out of, view by resolution of the Board. There are over 64 kilometres of IDB maintained Viewed Rhynes in the Plan area. Summary details of the Viewed Rhynes for North Moor and Salt Moor are set out in Table 1 and their locations are shown on Map 2. The control structures on these watercourses are listed in Tables 2 – 4.

3.6.3. Other watercourses

The Kingscliffe Stream originates to the west of the plan area on the eastern slopes of the Quantock Hills. It flows via North Petherton into Park Brook at Fordgate. On the west side of the Bridgwater-Taunton canal, the stream splits into three, and each watercourse is syphoned separately under the canal. The flows are collected by a collector drain on the east side of the Canal and flow into Haymoor Rhyne and Park Brook before draining into the River Parrett via the gravity outfalls at New House Farm Clyse and Elson's Clyse respectively.

Park Brook originates to the west of the Plan area as Buncombe's Brook and Spring Brook. These watercourses merge at King's Lock syphon under the Bridgwater-Taunton canal (west of Broadmead) to become the Park Brook. Park Brook becomes a Viewed Rhyne approximately 750m downstream of this siphon and is thought to contribute about 20% of the total discharge from Elson’s Clyse.

3.6.4. Private ditches

In addition to the Main Rivers and Viewed Rhynes, private ditches occur throughout the Plan area and the responsibility for maintenance of these watercourses lies with the riparian owner. This network of ditches is an integral part of the drainage and water supply network in the Plan area. They are particularly important as wet fences, to supply drinking water for grazing animals, and as habitats for a substantial part of the biodiversity interest of the Plan area.

Table 1: Schedule of arterial watercourses in North Moor and Salt Moor

Asset no.	Watercourse	Operating authority	Length (m)	Location & connections	Current maintenance regime	Control structures (see Tables 2 - 4)
8550	River Parrett	EA	9940	The Parrett forms the eastern boundary of the plan area from Burrowbridge to Lane End Farm, near Huntworth.	Both banks are flailed once annually at an appropriate time, ensuring that the flood bank is cut to the equivalent field ground level. An F2 weedcut specification is used on this section of river.	Lane End Farm Outfall New House Farm Outfall Elson's Clyse Outfall Northmoor Pumping Station Salt Moor Pumping Station
8950	River Tone (Stanmoor Bridge to Athelney Bridge)	EA	1640	The Tone forms part of the south eastern boundary of the Plan area from Athelney to its confluence with the Parrett at Burrowbridge.	Two Bradshaw weedcuts are taken each year in July and September. Flood banks are flailed to field ground level on both banks and most of the slope is cut on the working bank only. Weedcut maintenance specification W6 (FB) is used for this river.	Athelney Spillway
9030	North Moor Main Drain	EA	3530	Supplies water from Baltmoor Wall Inlet in the south to the Parrett IDB control sluice at Bankland Bridge and then on to North Moor Pumping Station. This Drain is a designated Main River from Bankland Bridge Sluice to North Moor Pumping Station.	One to two Bradshaw weed cuts per year depending on conditions, beginning in July. W3 weedcut specifications are used for this river.	North Moor Pumping Station Bankland Bridge Sluice
9020	Salt Moor Main Drain	EA	3500	The Drain begins north of Baltmoor Wall and runs initially south of the A361 before crossing in a culvert at Cular Rhyne to the north side. The Drain then takes an indirect route to the Salt Moor Pumping Station on the left bank of the River Parrett.	Two Bradshaw weed cuts are taken in July and September each year using W2 weedcut specifications.	North Moor Inlet Salt Moor Inlet Salt Moor Pumping Station Salt Moor Main Drain Trench Sheet Dam Weir Salt Moor Barrier Flap (West) New Road Sluice (Salt Moor Barrier Flap East)
NM 1	Sam Gamlins	IDB	542	From the ditch to east of the Canal to the Huntworth Road.	W2	NM 014, Lane End Penning Bay
NM 2	Haymoor Rhyne	IDB	1717	Flows south towards Haymoor Tilting Weir (NM 010) where it connects to the Park Brook east of Railway near Fordgate, and also east towards New House Farm Sluice (NM 013) where it connects to Thatcher's Rhyne.	W2	NM 010, Haymoor Tilting Weir NM 013, New House Farm Sluice
NM 3	Thatcher's Rhyne	IDB	1154	Connects with Haymoor Rhyne in the north and to Elson Clyce Sluice and Outlet (to the River Parrett) to the east.	W2	

Table 1 (continued): Schedule of arterial watercourses in North Moor and Salt Moor

Asset no.	Watercourse	Operating authority	Length (m)	Location & connections	Current maintenance regime	Control structures (see Tables 2 - 4)
NM 4	Park Brook east of Railway	IDB	849	From Fordgate, east of the Railway, and outfalls to the River Parrett via Elsons Clyce Outlet.	W1 or W2	NM 011, Fordgate Side Overflow NM 012, Elsons Clyce Outlet NM 016, Water Supply Pipe
NM 5	Fordgate Overflow	IDB	346	Rhyne connecting Park Brook east of Railway, downstream of Fordgate, to North Moor Main Drain.	W1 or W2	NM 009, Fordgate Overflow Sluice
NM 6	Park Brook west of Railway	IDB	2032	Rhyne lying between the Canal and the Railway, from upstream of Whites Farm to join the Park Brook east of Railway at Fordgate.	W1 or W2	NM 007, Park Brook Spillway
NM 7	Park Brook Rhyne	IDB	686	Rhyne linking the Park Brook Spillway with North Moor Main Drain.	W1 or W2	NM 007, Park Brook Spillway
NM 8	Black Hut to Banklands	IDB	1583	Rhyne immediately to the west of the Railway embankment, linking with Chadmead Rhyne, Godfrey's Rhyne and Park Brook Rhyne.	W2 or W3	
NM 9	Godfreys Rhyne	IDB	1438	Connects Broadmead Rhyne to North Moor Main Drain.	W2	
NM 10	Broadmead Rhyne	IDB	622	Upstream end of Godfrey's Rhyne.	W2	
NM 11	Coulthursts Rhyne	IDB	639	Upstream end of Chadmead Rhyne, to the north of White House Farm and Northmoor Corner.	W2	
NM 12	Chadmead Rhyne	IDB	1109	From Coulthursts eastwards under the Railway to North Moor Main Drain	W2	
NM 13	Coxhill Rhyne	IDB	978	From just north of Eames Farm in Northmoor Corner to the upstream end of Black Hut to Banklands.	W2	
NM 14	Bankland Stream	IDB	1647	From Kitches Farm, past Little Bankland Farm to connect with the upstream end of Rossiter's Rhyne.	W2	Unofficial spillways
NM 15	Rossiters Rhyne	IDB	375	Connects Bankland Stream to North Moor Main Drain.	W2	
NM 16	New Rhyne	IDB	1471	From disused railway line north east to the upstream part of North Moor Main Drain.	W2	
NM 17	Hitchings Rhyne	IDB	1841	From the Outwood to North Newton road, south east under the two railway lines then north east to connect to the upstream part of North Moor Main Drain.	W2	
NM 18	Cooks Rhyne	IDB	2183	Connects with the upstream end of North Moor Main Drain and runs to the west and to the east to connect with Hectors Lane Rhyne.	W2	
NM 19	Hectors Lane Rhyne	IDB	1318	North west from East Lyng then west to connect with the upstream part of North Moor Main Drain.	W2	
NM 20	North Moor Main Drain	IDB	783	From the Main River at Bankland Bridge upstream to connect with Cooks Rhyne.	W1 or W2	NM 002, Bankland Bridge Sluice

Table 1 (continued): Schedule of arterial watercourses in North Moor and Salt Moor

Asset no.	Watercourse	Operating authority	Length (m)	Location & connections	Current maintenance regime	Control structures (see Tables 2 - 4)
NM 21	Lyng Bridge / Bankland Drove	IDB	1261	From just upstream of the Lyng Bridge structure west to connect with the upstream part of North Moor Main Drain.	W2	NM 003, Lyng Bridge Penning Boards
NM 22	Baxters Rhyne	IDB	287	Short alternative connection between Lyng Bridge / Bankland Drove and the upstream part of North Moor Main Drain.	W2	
NM 23	Coates Rhyne	IDB	2070	North from East Lyng, connecting with Little Salt Moor Rhyne, Cular Rhyne, Lyng Bridge / Bankland Drove and West Yeo Rhyne.	W1 or W2	Temporary bund to replace dilapidated sluice
NM 24	Little Salt Moor Rhyne	IDB	482	North east from East Lyng.	W2	
NM 25	Baltmoor Inlet	IDB	973	From Baltmoor Wall Inlet north to connect with Little Salt Moor Rhyne and Coates Rhyne, and with Cular Rhyne.	W1 or W2	
NM 26	Cular Rhyne	IDB	1512	From Coates Rhyne in the west to Salt Moor Main Drain in the east.	W2	NM 001, A361 Structure NM 017, Trench Sheet Dam
NM 27	Philpott's Rhyne	IDB	628	North of Bankland Drove to connect with North Moor Main Drain (Main River section).	W2	NM 005, Philpotts Rhyne Penning Boards
NM 28	West Yeo Rhyne	IDB	958	West of West Yeo Farm, from Coates Rhyne to connect with North Moor Main Drain (Main River section). Also connects with Middlemoor Rhyne and with Phillips Rhyne.	W2	
NM 29	Middlemoor Rhyne	IDB	849	Connects with Kings Rhyne in the north. Also connects with upstream end of Gadds Drove Rhyne.	W2	
NM 30	Kings Rhyne	IDB	1074	From the Northmoor Green to Burrowbridge road west to connect with North Moor Main Drain (Main River section).	W2	NM 008, disused sluice
NM 31	Coates Rhyne (Horlake)	IDB	1921	Upstream section of Coates Rhyne, east of the Northmoor Green to Burrowbridge road. (Horlake Moor)	W2	NM 004, Bund near Lyng Bridge
NM 32	Ballam's Rhyne.	IDB	1085	Runs along the north side of Kitch Drove to connect with North Moor Main Drain (Main River section) at Kitch Bridge.	W2	
NM 33	Church Lane Rhyne	IDB	1314	Connects the north side of Northmoor Green with Ballam's Rhyne.	W2	
NM 34	Little Moor Rhyne	IDB	N/A	No longer a Viewed Rhyne.	N/A	
NM 35	Slades Drove Rhyne	IDB	917	East of the Railway just north of Little Bankland Farm and connecting with North Moor Main Drain (Main River section).	W2	
NM 36	New Rhyne Tributary	IDB	317	Upstream section of New Rhyne.	W2	

Table 1 (continued): Schedule of arterial watercourses in North Moor and Salt Moor

Asset no.	Watercourse	Operating authority	Length (m)	Location & connections	Current maintenance regime	Control structures (see Tables 2 - 4)
NM 37	Short Rhyne	IDB	237	From the north side of Hitchings Drove to New Rhyne.	W2	
NM 38	Gadds Drove Rhyne	IDB	515	From Middlemoor Rhyne in the east, under Gadds Drove to connect with North Moor Main Drain (Main River section).	W2	
NM 39	Phillips Rhyne	IDB	982	From north of Bankland Drove to connect with West Yeo Rhyne.	W2	
NM 40	Vicars Rhyne	IDB	614	Upstream of Godfrey's Rhyne.	W2	
NM 41	White's Drove	IDB	387	From the Railway Bridge over Whites Drove east to connect with North Moor Main Drain (Main River section).	W2	
SM 1	North east side of Long Drove	IDB	944	South east from the West Yeo Road, along the north east side of Long Drove to connect with Salt Moor Main Drain.	W1 or W2	
SM 2	Engine Rhyne	IDB	489	South side of Engine Drove to connect with Salt Moor Main Drain.	W2	
SM 3	Long Drove Side Rhyne	IDB	175	Short length of rhyne north east, and at right angles to, Long Drove.	W2	
SM 4	Long Drove/Cular Rhyne Side Rhyne	IDB	540	Rhyne south west of, and at right angles to, Long Drove. Connects with downstream end of Lot 4 to New House Farm Rhyne.	W2	
SM 5	Lot 4 to New House Farm	IDB	806	From New House Farm south east to Long Drove/Cular Rhyne Side Rhyne.	W2	
SM 6	Long Drove/ A361 Side Rhyne	IDB	454	Rhyne south west of, and at right angles to, Long Drove in Lower Salt Moor.	W2	
SM 7	Salt Moor Feed/A361 Side Rhyne	IDB	263	From the A361 north west to connect with Salt Moor Main Drain.	W2	
SM 8	Salt Moor Feed/Village Hall Side Rhyne	IDB	323	From the Northmoor Green to Burrowbridge road south west to connect with Salt Moor Main Drain.	W2	

3.7. Structures

3.7.1. Structures controlling inflows

A number of structures are used to supply water to the Plan area (Table 2). In flood conditions, North Moor receives water from overflows from Curry Moor to the south (via the Athelney Spillway on Baltmoor Wall and the disused Lyng Railway Cutting), from the Bridgwater and Taunton Canal and, to a lesser extent, from the Park Brook Spillway to the west.

Table 2: Structures controlling inflows to North Moor and Salt Moor

Asset no.	Inlet	Grid Ref.	Maintained by	Operated by
1122590200 101B08001	Baltmoor Wall Inlet	ST 3360 2903	EA	EA
1122590200 101L09003	North Moor Inlet	ST 3359 2905	EA	EA
1122590200 101B07004	Salt Moor Inlet	ST 3359 2905	EA	EA
1122590300 101L02003	S1 North Moor Corner Inlet, Park Brook. Providing feed to North Moor Corner RWLA	ST 3154 3144	EA	EA
	S2 North Moor Corner inlet. Controls inlet flow to North Moor Corner RWLA	ST 3152 3120	EA	ESA Agreement Holder
11221895001 02L14	Athelney Spillway	ST 3430 2930	EA	EA
1122489500 102L15	Lyng Railway Cutting	ST 3310 2880	Private	EA
	Lower Whites Farm Weir	ST 3150 3144	IDB	IDB
	Bridgwater & Taunton Canal Overflow Weir – old	ST 3197 3317	British Waterways	British Waterways
	Bridgwater & Taunton Canal Overflow Weir – new	ST 3197 3317	British Waterways	British Waterways
NM007	Park Brook Spillway	ST 3191 3186	IDB	IDB

3.7.2. Structures controlling outflows

North Moor and Salt Moor Pumping Stations and three gravity outfalls are used to control water leaving the Plan area (Table 3).

Table 3: Structures controlling outflows from North Moor and Salt Moor

Asset no.	Outfall	Grid Ref.	Maintained by	Operated by
1122590300101B01001	North Moor Pumping Station	ST 3315 3301	EA	EA
1122590200101R01002	Salt Moor Pumping Station	ST 3531 3086	EA	EA
1122585500201L07001	New House Farm Outfall	ST 3244 3390	EA	EA
1122585500201L11001	Elsons Clyse Outfall	ST 3297 3326	EA	EA
1122585500201L04001	Lane End Farm Outfall	ST 3218 3435	EA	EA

3.7.3. Structures controlling water levels within the area

Water levels within the Plan area are controlled by several structures located on the network of arterial watercourses (Table 4).

Table 4: Schedule of control structures affecting water management in North Moor and Salt Moor

Asset no.	Control Structure	Grid reference	Maintained by	Operated by	Rhyne or Main River (Table 1)	Description (function)	Dimensions & operating range
1122590300101 B01001	North Moor Pumping Station	ST 3315 3301	EA	EA	North Moor Main Drain	Pumping Station	Two of 1.1m^3/s submersible pumps (1 fixed, 1 variable) and two 1.1m^3/s centrifugal diesel pumps on standby
1122590200101 B01001	Salt Moor Pumping Station	ST 3531 3086	EA	EA	Salt Moor Drain	Pumping Station	2 no. 0.25 m^3/s submersible pumps; fixed speed
1122590200101 B08001	Baltmoor Wall Inlet	ST 3360 2903	EA	EA	Curry Moor Engine Rhyne	Sluice penstock	20m long culvert, 450mm diameter sluice penstock; 3.96m ODN invert. Reservoirs Act structure
1122590200101 L09003	North Moor Inlet	ST 3359 2905	EA	EA	Salt Moor Main Drain	Sluice penstock	12m long culvert, 450mm diameter sluice penstock; 3.50m ODN invert. Reservoirs Act structure
1122590200101 B07004	Salt Moor Inlet	ST 3359 2905	EA	EA	Salt Moor Main Drain	Sluice penstock	300mm diameter sluice penstock; 3.80m ODN invert. Reservoirs Act structure
1122585500201 L07001	New House Farm Outfall	ST 3244 3390	EA	EA	Haymoor Rhyne/ River Parrett	Flap valve	700mm diameter flap valve in concrete headwall
1122585500201 L11001	Elsons Clyse Outfall	ST 3297 3326	EA	EA	Park Brook/ River Parrett	Flap gate	1.0m wide, 2.0m high flap gate in concrete headwall
1122590200101 R07001	Salt Moor Barrier Flap (West)	ST 3415 2933	EA	EA	Salt Moor Main Drain	Flap valve	Flap valve in concrete headwall
1122585500201 L04001	Lane End Farm Outfall	ST 3218 3435	EA	EA	Unnamed watercourse	Flap Valve in piled concrete headwall	Condition and size and invert of pipe unknown.
1122189500102 L15	Lyng Railway Cutting	ST 3310 2880	Private	EA	Disused railway cutting near Lyng	Spillway	Disused railway cutting, acts as spillway with crest level of 7.18m ODN
1122189500102 L14	Athelney Spillway	ST 3430 2930	EA	EA	Between high areas on Athelney Hill, between Curry Moor & Salt / North Moor	Spillway	25.9m long grassed earth bank with a crest level of 7.13m ODN associated with Reservoirs Act structures
1122189500102 L12	Baltmoor Wall	ST 3370 2900	EA	EA	None	Flood embankment	Flood embankment. Reservoirs Act structure
NM 001	New Road Sluice (Salt Moor Barrier Flap East)	ST 3481 2958	IDB	IDB	Salt Moor Main Drain (south of A361 culvert)	Penstock	Penstock within a trench sheet dam
NM 002	Bankland Bridge Sluice	ST 3235 2972	IDB	IDB	North Moor Main Drain	Vertical Sluice Gate	1.95m wide, 0.61m high steel gate, plus 450mm high concrete invert (weir).
NM 003	Lyng Bridge Penning Bay	ST 3328 3000	IDB	IDB	Bankland Drove Rhyne	Stoplog	Timber stop log structure upstream of 1.2m diameter culvert; 1.7m wide boards
NM 004	Coate's Rhyne Earth Dam	ST 3346 3003	IDB	IDB	Coate's Rhyne	Earth dam on location of old redundant structure	

Table 4 (continued): Schedule of control structures affecting water management in North Moor and Salt Moor

Asset no.	Control Structure	Grid reference	Maintained by	Operated by	Rhyne or Main River (Table 1)	Description (function)	Dimensions & operating range
NM 005	Philpott's Rhyne Penning Bay	ST 3241 3009	IDB	IDB	Philpott's Rhyne (downstream end)	Stoplog	Timber stop log structure, 0.75m wide, 0.91m high (maximum)
NM 007	Park Brook Spillway	ST 3191 3186	IDB	IDB	Park Brook/ Park Brook Rhyne (1km south of Fordgate)	Fixed weir	2 no. fixed weirs (concrete & trench sheets), inlet pipe (uncontrolled) and 2 no. culverts
NM 008	Ballam's Rhyne Sluice (or Kitch Drove Sluice)	ST 3270 3233	IDB	IDB	Ballam's Rhyne (downstream end)	Sluice gate	1.5m wide, 1.20m high steel sluice gate in masonry headwall
NM 009	Fordgate Overflow Spillway	ST 3287 3279	IDB	IDB	Fordgate Overflow	Stoplog	To be added
NM 010	Haymoor Tilting Weir	ST 3211 3285	IDB	IDB	Haymoor Rhyne	Tilting Weir	Tilting Weir in concrete headwall.
NM 011	Park Brook Diversion Weir	ST 3275 3306	IDB	IDB	Park Brook (towards downstream end)	Stoplog	2 no. stop log structures with 6 no. 1.38m long stop log in each; 0.9m maximum weir height
NM 012	Elson's Clyse Sluice	ST 3294 3324	IDB	IDB	Park Brook	Gate	1.4m square head gate in stone headwall
NM 013	Sam Gamlin's Penning Bay	ST 3242 3390	Private	Private	Haymoor Rhyne	Sluice penstock	0.9m square steel sluice penstock on masonry headwall
NM 014	Lane End Farm Penning Bay	ST 3214 3431	Private	Private	Unnamed viewed rhyne near Lane End Farm	Stoplog	Timber stop log structure across headwall with 650mm opening
NM 016	Park Brook Diversion Sluice	ST 3296 3286	IDB	IDB	Park Brook	Supply pipe	
NM 017	Cular Rhyne Trench Sheet Bay	ST 3479 2959	IDB	IDB	Cular Rhyne (upstream end, north of A361 culvert)	Fixed weir	Fixed crest weir of interlocking trench sheets
-	Horlake Moor Sluice	ST 3362 3177	Private	Private	Upstream of Coate's Rhyne/Ballam's Rhyne junction	Sluice penstock	0.45m high, 0.7m wide steel sluice penstock in masonry/concrete headwall
-	Little Bankland Farm Weir	ST 3193 2990	Private	Private	Rossiters Rhyne (Bankland Stream)	Weir	Informal stone weir
-	Hitchings Rhyne Weir	ST 3150 2876	Private	Private	Hitchings Rhyne	Weir	Informal stone weir; 2.5m width (bank to bank) and 0.3m high crest
1122390300101 L02003	North Moor Corner Inlet: (S1 & S2)	ST 3154 3144 ST 3152 3120	EA	Private	Park Brook (the Whites)	(Controls inflow)	Two disc -flushing valves, culvert is ca 300m long 150mm dia plastic pipe
1122590300101 L02005	RWLA S3	ST 3170 3114	EA	Private	South of Godfrey's Rhyne, North Moor Corner	Stoplog	Stoplog structure with interlocking trench sheets and timber walkway
1122590300101 L03002	RWLA S4	ST 3180 3070	EA	Private	The south east corner of the RWLA North Moor Corner	Stoplog	Stoplog structure with interlocking trench sheets and timber walkway

Table 4 (continued): Schedule of control structures affecting water management in North Moor and Salt Moor

Asset no.	Control Structure	Grid reference	Maintained by	Operated by	Rhyne or Main River (Table 1)	Description (function)	Dimensions & operating range
1122590300101 L02006	RWLA E3	ST 3130 3100	EA	Private	West boundary of Block 1; connects to an ordinary watercourse	Non return valve	Culverted field access with NRV
1122590300101 L02008	RWLA E9	ST 3188 3128	EA	Private	North Boundary of Block 2; connects to Godfrey's Rhyne	Non return valve	Culverted field access with NRV
1122590300101 L03004	RWLA E19	ST 3142 3081	EA	Private	Block 1 connects to Chadmead Rhyne	Non return valve	Culverted field access with NRV
1122590300101 L02003	RWLA S1 and Lower Whites Farm Weir	ST 3155 3144	EA	EA	Park Brook	Feed to Northmoor Corner RWLA	Fixed weir and inlet pipe
-	Bridgwater and Taunton Canal Overflow Weir - old	ST 3197 3317	British Waterways	British Waterways	Bridgwater and Taunton canal	Overflow pipes	4m long fixed crest masonry weir & overflow pipes (1 no. 80mm diameter inlet and 4 no. 200mm diameter)
-	Bridgwater and Taunton Canal Overflow Weir - new	ST 3197 3317	British Waterways	British Waterways	Bridgwater and Taunton canal	Weir and culvert	10m long concrete weir with sheet piled face & 500mm diameter overflow culvert
-	Kingscliffe Stream Syphons	ST 3214 3266 ST 3212 3279 ST 3197 3310	British Waterways	British Waterways	Kingscliffe Stream & Park Brook (near Fordgate)	Inverted syphons	
-	Kings Lock Syphon	ST 3051 3133	British Waterways	British Waterways	Park Brook west of RWLA	Inverted syphon	
-	Copse Farm Sluices	ST 3190 3338 ST 3163 3332 ST 3175 3320	Private	Private	Private Ditch	3 no. sluices	
-	Petherton Park Farm Sluices	ST 3141 3261 ST 3167 3270	Private	Private	Kingscliffe Stream		

Notes: Inlets from Curry Moor are usually kept closed during a flood. However, if flood water in North Moor is under control and Curry Moor is still holding flood water, the inlets can be opened by agreement.

3.7.4. Gauge boards

The principal gauge boards within the North Moor and Salt Moor area are summarised in Table 5. All gauge boards are metric and are levelled to metres above Ordnance Datum Newlyn (ODN) relative to local Ordnance Survey benchmarks.

Table 5: Gauge boards in North Moor and Salt Moor

Location of gauge board	Grid reference	Notes	Operator
North Moor Main Drain			
- Northmoor Pumping Station	ST 331 330	u/s, d/s (+ telemetry site)	EA
- Vinney Bridge	ST 329 328	u/s	
- Kitch Bridge	ST 326 323	u/s	
- Middlemoor Bridge	ST 325 310	d/s (+ remote telemetry site)	
- Bankland Bridge	ST 323 297	d/s	
Salt Moor Main Drain			EA
- Salt Moor Pumping Station	ST 352 308	u/s, d/s (+ telemetry site)	
- Long Drove	ST 350 301	mid channel	
- A361 Culvert	ST 348 295	u/s	
Other			
- Gadd's Drove	ST 328 314	-	IDB
- Lyng Bridge Penning Bay	ST 332 300	u/s (not to datum)	
- Bankland Drove	ST 335 300	-	
- Chadmead Rhyne	ST 320 307	-	
- Hitchings Rhyne	ST 319 290	-	
RWLA			
- S2	ST 315 312	u/s	EA
- S3	ST 317 311	u/s	
- S4	ST 318 307	u/s	
- Godfrey's Rhyne	ST 315 312	u/s (Boundary Rhyne outside the SSSI)	

3.7.5. Water level telemetry

The Environment Agency has installed telemetry where there is an operational need to be kept informed of water levels and to alert staff to changes in water levels. The Environment Agency has telemetry installed at North Moor Pumping Station and Salt Moor Pumping Station, which remotely monitors water levels in both the Main Drain and the River Parrett.

The pumping stations have prescribed target water level ranges for summer and winter, and a series of alarms alert staff when water levels go outside of the predetermined range. Alarms have also been created for weed screens, pump failure, mains failure and telemetry failure. Alarms are received 24 hours a day, seven days a week by a National Incident Communication Service. The alarms are then passed on immediately to the most appropriate duty officer in the local area.

3.8. Abstraction and other hydrological management issues

There are no known significant, ongoing water resource issues which directly influence, or are influenced by, water level management within this catchment.

The Water Act (2003) has introduced a new statutory framework for managing water resources. Under the Act the abstraction of up to and including 20 cubic metres per day (approximately 4,400 gallons per day) from surface water or groundwater does not require a licence from the Environment Agency regardless of the purpose for which the abstracted water will be used. Abstractions above 20 cubic metres per day require a licence, issued by the Environment Agency. The Water Act (2003) also removes a range of exempt activities that currently do not require an abstraction or transfer licence. However, this section of the legislation has not yet been enacted (see the EA website for further information on licensing requirements under the Water Act (2003)).

The Environment Agency will consult the Parrett IDB and Natural England regarding its consideration of applications for an abstraction licence.

There are three abstraction licences that may affect water management in the Plan area, which are summarised in Table 6.

Table 6: Abstraction licences in or near North Moor and Salt Moor

Licence No	Point name	Description	Max daily Vol. (m^3)	Max annual vol. (m^3)
16/52/2007/S/172	Tributary of R Parrett (ST 3071 3003) Tuckerton spray irrigation reservoir (ST 3014 2994)	Spray irrigation	307	18,420
16/52/006/S/013	Saltmoor (ST 344 304)	Spray irrigation	310	15,300
16/52/007/S/013	Fordgate Field Drain (ST 319 322) Between ST 312 323 & ST 316 327 Between ST 318 329 & ST 319 331 Between ST 321 327 & ST 322 324	Spray irrigation	341	25,000

3.9. Water quality

There have been 20 years of steady water quality improvements across the Somerset Levels and Moors catchments; however, phosphate levels remain a concern. There are some local water quality issues in the Plan area related to diffuse and point sources of pollution. Diffuse pollution is primarily caused by high phosphate levels from nutrient enrichment (fertilisers) and private septic tank overflows. Point sources of pollution mainly occur at sewage treatment works.

The Environment Agency and Natural England are currently developing 'Diffuse Water Pollution from Agriculture' plans that aim to reduce nutrient enrichment of watercourses and promote good agricultural practice through the Catchment Sensitive Farming Programme. The Environment Agency has also undertaken nutrient modelling to identify the relative importance of diffuse and point sources to nutrient enrichment in the catchment and is working with the water companies to reduce nutrient discharges from sewage treatment works.

Weed-cutting activities can also cause significant drops in dissolved oxygen (DO) levels on most watercourses. The Environment Agency's Operations Delivery team take DO readings before

and during weed cutting to ensure water quality does not deteriorate rapidly. If DO levels drop below 20%, all operations stop immediately, including the operation of Pumping Stations, especially in summer. This practice helps to prevent fish kill and unnecessary damage to the aquatic environment.

It is illegal to discharge raw sewage or trade effluent directly into any controlled watercourse. Controlled discharge of treated effluent requires consent to discharge, which must be obtained from the Environment Agency. The Environment Agency should be informed of any water pollution problems, particularly septic tank discharges, to allow investigation and improvement. In the event of a pollution incident being noted, assistance should be sought immediately from the Environment Agency's incident pollution hotline on 0800 80 70 60.

There are a number of discharge consents in or near the North Moor and Salt Moor Plan area, as set out in Table 7.

Table 7: Discharge consents in or near Kings Sedgemoor and Aller Moor

Consent no.	Site Name	Grid reference	Discharge type
101640	North Petherton STW	ST 29933 32782	Sewage disposal works
100947	Shire's Terrace	ST 32945 33231	Sewage disposal works
102406	Northmoor Pumping Station	ST 33187 33014	Undefined
070768	1-4 Church Road	ST 33624 31935	Sewage disposal works
080125	Whites Farm	ST 31599 31490	Livestock/food production
012975	East Lyng STW	ST 33284 29228	Sewage disposal works
080516	Stags Farm	ST 31898 28505	Livestock/food production
080131	Bankland Farm(Bridgwater)	ST 31903 29902	Livestock/food production
071752	The Royal Oak	ST 30977 30527	Public houses and bars
080132	Eames Farm(Bridgwater)	ST 30794 30404	Livestock/food production
101802	Church Road Pumping Station	ST 30207 31090	Sewerage network - pumping station

4. Agriculture and other land uses

4.1. Agriculture

Agriculture is the predominant and most extensive land use within the Plan area. Most of the land is divided into small fields which are usually separated by watercourses or a combination of hedge and watercourse. The watercourses are used to provide drinking water for livestock and as wet fences. The Parrett IDB recognises the importance of agriculture within the Plan area and the key role that the effective management of water has to play in enabling this land use to prosper within the area. The Board also recognises that additional investment in the water management system will be required in the years to come in order to achieve the combined objectives of conservation and farming in the Plan area.

Livestock farming is the primary land use, with improved, semi-improved and unimproved grassland used for grazing and for winter fodder covering about 80% of the farmed area. Livestock farming systems not only produce food but the wider land management they provide is crucial in delivering conservation outcomes, for example through agri-environment agreements. Farm businesses need continual re-investment to survive and if their food production and conservation land management are to continue.

Withies (willows) are grown on North Moor for making baskets, hurdles and furniture. The withy beds are harvested after leaf-fall in the late autumn or winter, and vehicular access to the beds is important for harvesting the crop at this time of year.

The growing need for food security, and the growing demand for quality food to supply the increasing population of the UK and elsewhere, may stimulate additional investment in agriculture on some farms in the area in the coming years. The larger farm units in particular have invested in productive capacity over the years and will continue to do so in line with market signals. Many will also continue to deliver environmental outcomes alongside food production. Within the North Moor SSSI, appropriate balances will be sought between agriculture, nature conservation value, flood risk and the vulnerability of peat soils.

4.2. Built development, services and transport

A number of domestic and commercial properties in the Plan area depend either directly or indirectly on effective flood protection and water level management. Low lying properties, utilities infrastructure and minor roads (which provide essential transport links) would suffer from flooding or waterlogging without the appropriate maintenance of flood defences, Main Rivers and IDB Viewed Rhynes.

The provision of adequate land for housing and employment is a national priority and Local Planning Authorities are charged with ensuring that sufficient land is made available though the new Local Development Frameworks. However, new development in areas of high flood risk may not be sustainable, particularly where these low lying areas are protecting existing development by providing space for water.

The Local Authorities consult the Environment Agency and the Parrett IDB on strategic plans, such as the new Local Development Frameworks, and on individual applications of significance. Planning Policy Statement 25 (PPS25, December 2006) sets out Government policy on development and flood risk. It aims to ensure that flood risk is taken into account, at all stages in the planning process, to avoid inappropriate development in areas at risk of flooding and to direct development away from areas of highest risk.

In the exceptional cases where new development is necessary in areas of flood risk, the policy aims to make it safe, without increasing flood risk elsewhere. Where possible, developers are encouraged to work with the Planning Authority and the Drainage Authorities to use opportunities for new development to reduce flood risk overall.

4.3. Recreation

The Environment Agency has a duty to consider recreation on or near water and aims to create a quality of environment that people will be able to enjoy. The Agency's vision is to conserve and improve the quality of the river environment whilst balancing recreational interests on water (e.g. canoeists, rowers, anglers and boaters) and on river banks (e.g. cyclists, horse-riders, walkers and bird watchers).

The River Parrett Trail is a nationally recognised walk which draws tourists to the area. The number of people using the trail is expected to grow as demand for recreation increases each year.

4.4. Fisheries

The Environment Agency has a duty to maintain freshwater and eel fisheries. These fisheries are a major part of the wildlife interest and ecology of the Plan area; especially eels, which are widely distributed and are a favoured food for both otters and fish-eating birds. Works to improve water level management will have to consider fisheries improvements, and any new structures should allow for the free movement of eels and elvers. The Environment Agency's fisheries officers can provide advice to ensure that fisheries are safeguarded and that the Environment Agency's duty to fisheries is not prejudiced.

Some of the watercourses in the catchment area are de-silted and weed-cut for flood risk management purposes. As these practices can disturb spawning fish, remove spawn or reduce cover for fry, the method and timing of weed cutting and de-silting must be carefully considered to avoid these impacts. In some watercourses, excessive build up of duckweed at penned structures can be a problem during the summer that can result in de-oxygenation. Removal of the duckweed is difficult, although the use of floating booms across the watercourse can help to prevent the duckweed from completely covering the water surface.

There are no commercial coarse fishing lakes in the Plan area although fishing does take place on the Bridgwater and Taunton Canal.

5. Nature conservation and archaeology

5.1. Nature conservation interests

The Plan area contains:

Part of a wetland of national importance for:

a) Botanically rich, unimproved wet meadows and mires;

b) Ditch flora, including species which are nationally scarce, and relict fen species on ditch banks;

c) Ditch fauna, including species which are nationally rare or scarce;

d) Meadow fauna, including species which are nationally rare or scarce;

e) Breeding wetland birds, such as sedge and reed warblers, lapwing, snipe, ducks and rails / crakes.

The Plan area includes:

a) North Moor SSSI (671 hectares / 1658 acres) notified in 1986;

b) Part of the Bridgwater and Taunton Canal County Wildlife Site.

The locations of the nature conservation sites are shown on Map 5 and Natural England’s advice to the Parrett IDB on the water management requirements for North Moor SSSI is summarised on Map 7.

Box 1: Favourable condition for wetland SSSIs in Somerset

An SSSI is considered to be in favourable condition when the special habitats and features of an SSSI are in a healthy state and are being conserved for the future by appropriate management. The Government's Public Service Agreement with DEFRA requires that 95% of all nationally important wildlife sites (SSSIs) are in a favourable (or unfavourable recovering) condition by the end of 2010.

Water management requirements for wetland SSSIs in Somerset

The following information summarises Natural England's advice to the Parrett IDB on the water management requirements needed for wetland SSSIs in Somerset to achieve favourable condition.

For ditch and grassland interests in winter:

- At least 30cm of water in the bottom of rhynes and ditches except in those around the margins of the SSSI where the ground levels are slightly higher.
- Summer water level at not more than 30cm below mean field level from 1 April to 30 November.

For wintering birds:

In early winter (from mid November):

- Gradual rising water levels to create extensive pools providing surface water covering 20 to 50% of the majority of fields with the lowest lying fields being close to 50%.

In mid winter (1 December to 28 February):

- Extensive areas of splashy conditions and shallow pools up to 25cm deep covering at least 50% of the majority of the fields;
- Deeper water roosts of at least 60ha, with water 25 to 75cm deep.

In late winter and early spring (to end of March):

- Gradual lowering of mid winter levels with some splashy conditions and shallow pools remaining through late February and into March in the lowest fields.

For breeding waders in spring (ideally blocks 50ha or more in size):

In early spring (1 March to 30 April):

- Extensive pools providing surface water covering up to 25% of the majority of fields with the lowest lying fields being close to 25%.
- On higher fields and species-rich fields, limited surface water covering less than 10% of the field.

In mid spring (May):

- Some pools in the lower lying fields covering up to 15% of surface area with soft ground and damp soils elsewhere;
- Low intensity grazing from mid-May in those fields not being laid up for hay.

In late spring (June):

- A few surface pools present in the lowest lying fields towards the end of this period and into July.

5.2. Biodiversity Action Plans

The floodplain grazing marshes found within the North Moor area are considered a habitat of primary importance in the UK Biodiversity Action Plan (1996). Furthermore, the 64km of Main Rivers and Viewed Rhynes in the Plan area, and the associated network of ditches and ponds, are biodiversity rich habitats that support good populations of priority BAP species such as water voles and otters.

The IDBs in Somerset have recently completed a biodiversity audit of all BAP species and habitats in their drainage districts and used this information to prepare a Biodiversity Action Plan relevant to IDB activities and interests (April 2010). The introduction of an IDB BAP for Somerset is intended to assist the integration of biodiversity conservation and enhancement works into IDB planning and work programmes. The new IDB BAP will also allow the Somerset IDBs to demonstrate and record their important contributions to conserving biodiversity. The Somerset IDB BAP sets objectives and targets for the conservation and enhancement of wetland species and habitats, and provides a link to the national and local BAP targets. The IDB BAP will also be used to report progress on the implementation of all IDB WLMPs in Somerset.

5.3. Conservation management

The current practices, adopted by the Parrett IDB and the Environment Agency for the maintenance of watercourses, help to maintain the conservation and biodiversity interest of these wetland habitats in balance with the need for effective drainage and irrigation throughout the Plan area.

Financial support for the conservation management of land is available to farmers and landowners from Natural England, who administers the Environmental Stewardship scheme on behalf of DEFRA. Such agri-environment schemes operate on the principle that the landowner, or farmer, voluntarily enters into an agreement where payment is made in return for following land management practices that benefit the environment. Farmers can join Entry Level Stewardship (ELS), where a basic payment is made for 5 years for basic environmental management, or Higher Level Stewardship (HLS), which is more targeted and provides higher payments for more demanding conservation management over 10 year agreements. Many farmers in the area have still to complete their agreements under the previous Somerset Levels and Moors Environmentally Sensitive Area (ESA) Scheme.

5.4. Archaeology

The wetlands of the Somerset Levels and Moors contain a wealth of archaeological information often hidden under layers of peat and clay that have built up over many millennia. This has had three significant effects:

a) Organic remains such as wood and leather are preserved because the waterlogging excluded oxygen and prevented the normal types of decay which destroy these materials on normal archaeological sites;

b) The waterlogged conditions also preserve pollen grains, plant material, insects, snails and even macroscopic plant and animal remains. These constitute a unique record of the past natural and man-made environment stretching back over the last 6,000 years. They can also provide information concerning human activity on the neighbouring dry land, and past changes in climate and sea levels;

c) The normal methods of archaeological detection do not work well in wetland areas where sites can be deeply buried. The number of known archaeological sites is therefore only a small fraction of the existing total. It is extremely likely that all the river valley wetlands in Somerset contain a wealth of important archaeological sites. In

addition there are several types of sites such as fisheries, medieval flood defences and small river ports of which we know very little, but may exist in considerable numbers.

The organic archaeological remains from the Somerset Levels and Moors depend for their continued survival, on an anaerobic waterlogged burial environment. If the surrounding peat or clay dries out, the organic material will shrink considerably and crack apart. The presence of oxygen will also allow bacterial and fungal decay to resume and eventually completely destroy the artefacts.

The peat itself, and the precious information contained within it, is also adversely affected by desiccation. Where field water tables are below ground level for long periods of time, the shrinkage and chemical breakdown of peat soils can be significant and can destroy all the archaeological information contained within them. In this regard, the summer is the crucial period, as that is when in-field water tables are generally at their lowest and therefore peat wastage highest.

All the known archaeology in the area is contained in the County Sites and Monuments Record which is kept in map form and on computer at County Hall, Taunton. This represents information collected from aerial photographs, excavations, chance finds, observations of drainage ditches and other sources. However, in the Somerset Levels and Moors, the deep deposits of clay and peat that have built up over thousands of years mean that much of the local archaeology in the area remains hidden from the normal forms of archaeological detection. Therefore the known archaeology recorded on the Sites and Monuments Record represents only a fraction of the total archaeological resource that lies below the surface.

A water management system beneficial to the preservation of wetland archaeological is a key objective of the WLMP. The locations of the archaeological sites in the Plan area are shown on Map 6.

6. Constraints and impacts on adjacent ground

6.1. Works adjacent to Main River

Any work proposed in, over, under or adjacent to Main River requires Flood Defence Consent (FDC) from the Environment Agency. Land Drainage Byelaws require third parties to apply for consent for any alterations or new works within an eight metre strip on either side of the Main Rivers. Where consent is applied for on land which forms part of an SSSI, or other designated site, the applicant is obliged to consult Natural England. Where works may affect a European designated site, the Environment Agency will undertake a test of likely significance and seek Natural England's approval before a consent can be issued. These conditions will also apply to proposals that lie outside the boundary of a designated sites but which may impact on the site.

6.2. Works adjacent to IDB rhynes

Under the Land Drainage Act (1991), the Parrett IDB has administrative responsibility for all the Viewed Rhynes and ordinary watercourses within the Plan area for the purposes of consenting activities as set out in the IDB's Byelaws. The Parrett IDB exercises this administrative control using a series of policy documents adopted by the IDB for this purpose.

The Parrett IDB Byelaws require third parties to apply for consent for any alterations or new works within a nine metre strip on either side of a Viewed Rhyne. Where consent is applied for on land within a SSSI, the IDB consults Natural England before arriving at its decision. The form of consent given by the IDB states that such consent does not override the necessity of obtaining other statutory consents (including that of Natural England).

6.3. Private ownership of land and property rights

Most of the land within the Plan area is under private ownership and is occupied either by the owner or by tenants, licensees, graziers etc. For the WLMP to be sustainable and succeed, any works or proposals to vary water levels must respect all legal obligations and responsibilities including property rights. As mentioned in 4.1, the predominant land use across the Plan area is agriculture, and changes in water levels can potentially have a significant impact on agricultural activities carried out by owners and/or occupiers. Changing of water levels to achieve conservation objectives (e.g. within SSSI areas) will be achieved most sustainably through negotiation of individual agri-environment agreements under the HLS scheme, whereby farmers receive an appropriate payment in return for their management which delivers the public benefit (in terms of favourable SSSI condition).

7. Current water management practices

7.1. Current water level management regime

In general, water levels are maintained at a relatively high level during the summer months to provide wet fences and, to a certain extent, to keep water tables high to promote the growth of grass and other crops. During the winter periods, water levels are lower in order to accommodate increased rainfall and runoff, and to reduce the risk or severity of flooding.

Seasonal changes in water levels are normally implemented on the 1 April for summer levels and 1 December for winter levels. In practice however, the seasonal water levels are usually phased in two weeks either side of these 'normal operating dates'. This system has come about through custom and practice and generally works well. From time to time, depending on the prevailing weather conditions, requests may be received by the Parrett IDB to advance or delay these seasonal operations. Under these circumstances, the IDB will consult Natural England before advancing or delaying the normal operating dates by more than two weeks.

7.1.1. Current target water levels

The current target water levels for key control structures within the Plan area are set out in Table 8 and any proposed changes in target waters levels are detailed in Table 13. The Parrett IDB will consult Natural England and the Environment Agency if they are considering changing the water levels at a structure so that it falls outside the range given in the Plan. Target water levels have been adjusted for gauge board errors and relate to metres above Ordnance Datum Newlyn (ODN).

7.1.2. Contingency measures for drought

During a drought situation the Environment Agency will encourage the public and industry to practice water efficiency and to conserve water, whilst all abstraction licence holders will be encouraged to minimise water abstraction. There will also be close liaison between the Environment Agency and the Parrett IDB to conserve water and to ensure a fair distribution of what water is available.

If there is an exceptional shortage of rain, or a serious deficiency in water flow that threatens flora or fauna, drought permits or orders may be issued. Drought permits are issued by the Environment Agency to enable water companies to take water from new sources or to alter restrictions on existing abstractions. Drought orders, issued by the Secretary of State, go further and restrict the non-essential use of water.

Table 8: Current target water levels in North Moor and Salt Moor

Control structure	Grid Reference	Operated by	Summer level (m ODN)	Winter level (m ODN)	Flood conditions
North Moor Pumping Station	ST 3315 3301	EA	3.30	3.07	Pumping when conditions allow
Salt Moor Pumping Station	ST 3531 3086	EA	3.68	3.45	Pumping when conditions allow
Banklands Bridge	ST 3235 2972	IDB	Gate lowered ~3.60	Gate raised ~3.10	Gate raised
Philpott's Rhyne Structure	ST 3241 3009	IDB	Stop logs in place ~3.40	One stop log in place ~3.20	Not operated
Lyng Bridge Penning Bay	ST 3328 3000	IDB	Stop logs in place ~ 3.70	Stop logs removed ~3.20	Not operated
Elson's Clyse Penning Bay on Park Brook	ST 3294 3324	IDB	Gate lowered (level unknown)	Gate raised (level unknown)	Gate raised
Haymoor Rhyne Tilting Weir	ST 3211 3285	IDB	level unknown	level unknown	No pen

Notes: **- Summer season:** Aim to achieve summer pen levels by 1st April.
- Winter season: Aim to achieve winter pen levels by 1st December.
- [~] approximate water level.
- ODN: Ordnance Datum Newlyn.

7.1.3. Raised Water Level Areas

There are four Raised Water Level Area (RWLA) schemes in the Plan area, where high water levels are maintained in winter and spring to provide suitable wetland conditions for wildfowl and waders (see Box 2 for target conditions). Within these schemes, water levels are held at mean field level in winter, whilst in the summer the levels are generally 300mm lower or at the normal summer pen, whichever is higher. The largest RWLA on North Moor is managed by the Environment Agency, with three smaller privately operated schemes on Salt Moor. Details of these areas are set out in Tables 9 & 10 and their locations are shown on Map 4.

Table 9: Raised Water Level Areas in North Moor and Salt Moor

RWLA	Maintained & operated by	Area in hectares	Area in acres
Northmoor Corner	EA	37.1	91.7
Salt Moor 1	Mr Knight	6.8	16.7
Salt Moor 2	Mr Gillard	19.8	48.8
Salt Moor 3	Mr Hector	7.9	19.4

Table 10: Current target water levels for RWLAs in North Moor and Salt Moor

Structure	Maintained & operated by	Target conditions – winter and spring	Summer water levels (m ODN)	Winter water levels (m ODN)
North Moor Corner RWLA Block 1	EA	Winter splash and spring splash	3.34	3.64
North Moor Corner RWLA Block 2	EA	Winter splash and spring splash	3.30	3.54
Mr Knight (Salt Moor 1)	Private	Winter splash	1.68	1.70 [1]
Mr Gillard (Salt Moor 2)	Private	Winter splash	1.68	1.70 [1]
Mr Hector (Salt Moor 3)	Private	Winter splash	1.70	1.80 [1]

Notes: - See Box 2 for target conditions

7.2. Current flood management regime

The Environment Agency has permissive powers to carry out works to reduce flood risk on Main Rivers. The primary flood defences within this Plan area are raised earth embankments located on either side of the River Parrett, with a few small sections of harder engineering (e.g. steel piles and masonry walls) where space is at a premium. These defences are inspected regularly to ensure they provide the flood risk management benefit that they were designed for. The Environment Agency also undertakes routine maintenance i.e. weed cutting, tree pruning and removal. Emergency repair and maintenance works are carried out when necessary. Environment Agency staff are deployed to monitor high tides on the tidal section of the Parrett as far as Oath Lock Sluice.

The North Moor and Salt Moor catchments include an upland area and flooding of the low-lying area occurs when the North Moor and Salt Moor Pumping Stations are unable to cope with the inflows, or when discharge is impossible against high levels in the tidal River Parrett.

Curry Moor, which lies to the south of the Plan area, is designated a Flood Storage Area under the Reservoirs Act 1975. In a significant flood event, when the flood storage capacity of Curry Moor (and Hay Moor) is exceeded, flood water overflows into the North Moor and Salt Moor catchments via Lyng Railway Cutting and Athelney Spillway. If the water levels rises even further then Baltmoor Wall, an historic flood embankment (and a Reservoirs Act structure) between Curry Moor and North Moor/Salt Moor, may be overtopped. Athelney Spillway overtops to the Salt Moor catchment whilst Lyng Railway Cutting conveys water into the North Moor catchment however, North Moor can also flood from Salt Moor when the flows over the Athelney Spillway are high.

Following a flood event, Curry Moor can remain flooded for a number of weeks. The summer feed connections to North Moor and to Salt Moor (the Baltmoor Wall, North Moor and Salt Moor Inlets respectively) can provide very limited relief to flood waters in Curry Moor, although when Curry Moor starts to fill the procedure is to shut the inlet at Baltmoor Wall. The culverts have a small capacity and their main purposes are to act as feeds into North and Salt Moors, rather than evacuations from Curry Moor. Even though it is a small culvert, the opening of the Baltmoor Wall Inlet during flood conditions on Curry Moor would likely cause flooding of the A361 and increased flood risk to properties nearby. The main functions of North Moor and Salt Moor Pumping Stations are to drain and manage water levels on their respective Moors. These pumping stations may be switched on if Athelney Spillway runs.

The Environment Agency regularly inspects and operates the main inlet structures into the Plan area. During flooding conditions in the Plan area, the two Pumping Stations are operated by the Environment Agency to evacuate flood water for the Moors until high water levels in the River Parrett make pumping ineffective. The North Moor Pumping Station is not operated when levels in the Parrett exceed 7.50m and the Salt Moor Pumping Station is not operated when levels in the Parrett exceed 7.20m. When the River Parrett is above these critical levels, the pumps are switched off manually and operatives monitor the situation until river levels drop and pumping can resume.

7.2.1. Contingency measures for flooding

The Environment Agency carries out active monitoring of raised flood banks during high flows, and ensures that outfall structures are kept clear of debris to allow evacuation of flood water as safe working conditions allow. The Environment Agency will also carry out emergency works as required to protect people and property.

The Environment Agency and the Parrett IDB are investigating the potential benefits of pre-emptive lowering of water levels at key control structures in anticipation of extreme weather conditions. It has been suggested that early action at certain control structures may reduce the severity of damage caused by overland flooding at critical times of the year, especially in summer. This work is at an early stage and will need to consider the impacts on the SSSI and the concern that it may be difficult to restore summer pen levels if forecast rainfall does not occur.

The Parrett IDB will ensure that all weed-screens on Viewed Rhynes are cleared on an 'as required basis' and that watercourses are running freely to assist the evacuation of flood water.

Box 3: Flood Zones

The Flood Map shows areas across England and Wales that could be affected by flooding from rivers and/or the sea. It has been produced by the Environment Agency to raise awareness among the public, local authorities and other organisations of the likelihood of flooding and to encourage people living and working in areas prone to flooding to find out more and take appropriate action. The Flood Zones in the Plan area are shown in Map 8.

Flood Zones are also known as floodplains which could be affected by flooding from rivers and the sea. There are three zones which are defined in the Government's planning policy for England. They ignore the presence of existing flood defences as these can be overtopped and even fail in an extreme event.

Zone 1 - is shaded white and shows areas with the lowest probability of flooding from rivers or the sea and where the chance of flooding in any one year is less than 0.1% (i.e. less than a 1 in 1000 chance).

Zone 2 - is shaded turquoise and shows areas where the chance of flooding in any one year is between 0.1% and 1% for flooding from rivers (i.e. a 1 in 1000 to a 1 in 100 chance), or 0.5% for flooding from the sea (i.e. 1 in 200 chance). The outer edge of this zone is referred to as the 'Extreme Flood Outline' (EFO).

Zone 3 - is shaded blue and shows areas with the highest probability of flooding where the chance of flooding in any one year is greater than 1% for flooding from rivers (i.e. a 1 in 100 chance), or 0.5% flooding from the sea (i.e. a 1 in 200 chance).

It is important to understand that a 1 in 100 chance of flooding in any one year does not mean that level of flood will happen once every 100 years, nor does it mean that if the flood hasn't happened for the last 99 years, it will happen this year. In fact, a flood of this magnitude may occur more than once in a year.

7.3. Current watercourse maintenance regimes

7.3.1. Environment Agency maintenance practices

The Environment Agency assesses all maintenance works on the basis of flood risk to people and property and whether the management system is rated as high, medium or low risk. As a result, maintenance is targeted towards high risk systems. The Environment Agency regularly reviews its annual and intermittent maintenance procedures, in accordance with national guidance and policy, to ensure that a high level of flexibility and efficiency of funding and staffing allocation are achieved.

The Environment Agency operates a flexible, annual weed cutting programme during the summer months. The Main Rivers are inspected prior to starting and the programme can be changed to accommodate urgent cuts or abnormal weather and vegetation conditions. It is normal practice to provide good access for weed-cutting machinery, which consists of culverting side ditches and providing gates and side fencing so that travel across field boundaries is unrestricted. The Environment Agency does not typically use herbicides in the Plan area.

The North Moor Main Drain was de-silted in the winter of 2009/2010 as part of a wider investigation into the flood risk management and environmental benefits of silt removal from Main Rivers. This work is supported by the IDB and Natural England and the outcomes of the North Moor Main Drain trial will be monitored to assess its effectiveness. Once these investigations are complete, the Environment Agency will communicate its findings to the IDB and the local community.

The River Parrett lies adjacent to the eastern boundary of the Plan area and receives water from the North Moor and Salt Moor Pumping Stations. The left and right banks of the River Parrett are flailed annually where no regular grazing takes place. This is done to control weed growth and to reduce the risk of burrowing mammals (e.g. rabbits and badgers) destabilising the banks. The tidal sections of the River Parrett and River Tone carry heavy silt loads on each tide and the merits and cost effectiveness of de-silting these rivers is currently being investigated by the Environment Agency.

Trees, branches and bushes within the channel area are trimmed, coppiced or pollarded to allow maximum flow, whilst retaining as much shade as possible to reduce weed growth. Tree removal will take place in exceptional circumstances where blockage of the channel has occurred, or is likely to occur. The Environment Agency expects riparian landowners to maintain trees and vegetation that could cause flood risk. Where necessary, the Environment Agency will serve notice on landowners to ensure that works are completed as requested. Where the Environment Agency owns land, it will carry out any required tree maintenance.

7.3.2. Parrett IDB maintenance practices

The Parrett IDB maintains all Viewed Rhynes in the North Moor and Salt Moor area once a year in late summer. Viewed Rhynes are occasionally de-silted to prevent their condition from deteriorating and to sustain the required water depth and flow. Aquatic herbicides are not routinely used by the IDB, but may be used to control invasive plants. The use of aquatic herbicide in any watercourse requires consent from the Environment Agency and from Natural England when used within the SSSI.

The maintenance of watercourses adjoining Viewed Rhynes is the responsibility of the riparian occupiers. The Board has powers under its Byelaws to require occupiers to fulfil their obligations in this respect where they fail to do so.

The majority of non-arterial rhynes (private ditches) on North Moor are also maintained by the Drainage Board, usually on a three to four year rotation. This practice was established by the

former Northmoor IDB and has been continued by the Parrett IDB, but is subject to review and availability of Board resources. The Board has powers under its Byelaws to require occupiers to fulfil their obligations to maintain their watercourses in a reasonable condition.

Water control structures are inspected by the Parrett IDB on a regular basis and repaired as necessary. The Board does not accept any liability for the maintenance of bridges and culverts over Viewed Rhynes, however it is prepared to consider making an *ex gratia* contribution of a share of the cost of such maintenance, approximately in proportion to its usage by the IDB. The Parrett IDB does not accept any liability for the maintenance of droves, and only carries out such maintenance, or contributes to the cost of maintenance, where droves are essential to the Board for gaining access to a channel, or where damage has been caused by works carried out on behalf of the IDB.

8. Objectives for water level management in the future

The Water Level Management Plan is based on the following objectives which have been adopted by the signatories to the Plan. The signatories acknowledge that not all the objectives can be achieved on each and every occasion or location.

Objective 1 – Balance of interests
Firstly, ensure that all legal obligations and responsibilities are met and secondly, balance different interests by managing water in a way that reflects the local hydrology and topography of the area and which best serves the owners and farmers of the majority of the land within each sub-catchment.

Objective 2 – Agriculture
Maintain seasonal water levels that provide wet fences, stock watering and drainage appropriate for the principal land management and farming practices in each sub-catchment.

Objective 3 – Biodiversity
Maintain and enhance, when suitable opportunities arise, wet grassland, wetland and freshwater aquatic habitats and species throughout the Plan area, with particular attention being given to those protected by law or designated in some way.

Objective 4 – Favourable condition of SSSIs
Implement a programme of improvement works to ensure that the management of water that affects the SSSI in the Plan area helps to secure, or makes significant progress towards achieving, this SSSI being in favourable condition by December 2010.

Objective 5 – Organic soils and archaeology
Maintain a stable, year round water table that avoids desiccation and oxidation of the organic soils.

Objective 6 – Settlements and highways
Ensure the proposed changes in water management do not increase the flood risk to settlements, property, highways, utility infrastructure or rights of way.

Objective 8 – Watercourse maintenance operations
Maintain the watercourses in the Plan area on rotation and in a sympathetic manner, to maintain an adequate flow of water around the sub-catchments and to enhance the diversity of ditch habitats and their associated flora and fauna.

Objective 9 – Water quality
Sustain the ditch flora and fauna in the Plan area through the provision of an adequate supply of water of high quality (defined as having water in a ditch at a given season, of sufficient quality and volume to sustain the full diversity, abundance and distribution of all aquatic plants and animals recorded in the area).

Objective 10 – Flood management
Mitigate the impacts of flooding where these are damaging to the biodiversity and agricultural interests of the Plan area.

Objective 11 – Drought management
Mitigate the impacts of drought where these are damaging to the soils, biodiversity, archaeology and agricultural interests of the Plan area.

9. Proposed water management practices

9.1. Continuation of current good practice

Many of the current management practices carried out by the Parrett Drainage Board and by the Environment Agency are meeting the needs of both farming and conservation. These good practices will continue, as set out below.

Proposal 1: The current summer penning levels at the key control structures, as set out in Table 13, will continue to be maintained by the Parrett IDB and the Environment Agency.

Reason: The current summer water levels throughout the Plan area are considered suitable for farming and nature conservation. The summer penning levels that will continue to be maintained by the Parrett IDB and the Environment Agency are set out in Table 13 (see proposal 6).

Proposal 2: Maintenance of the current Viewed Rhyne network will continue to be undertaken by the Parrett IDB.

Reason: The Parrett IDB will continue to maintain the existing Viewed Rhyne network, as shown on Map 2, and is of the opinion that its maintenance procedures help to achieve favourable condition and to further conservation and biodiversity in the Plan area. The Parrett IDB will also complete a review of its maintenance procedures for the de-silting of Viewed Rhynes and the routine maintenance of non-arterial watercourses by the Board within the SSSI (see Proposal 10).

9.2. Proposed changes to water control infrastructure

Natural England has advised the Parrett IDB that the management of water, in some parts of North Moor SSSI, does not allow the designated site to be recorded as being in a favourable condition for wildlife. Capital improvements to water control structures are required to enable the Parrett IDB to change the management of water levels in winter and spring in order to achieve favourable condition across the SSSI and to maintain favourable conditions in the future.

Proposal 3: Capital improvement works will be carried out by the Parrett IDB to help achieve favourable condition on North Moor SSSI.

Reason: A number of capital improvement works are proposed by the Parrett IDB in order to help achieve the objective of favourable condition on North Moor SSSI. These proposed works are listed in Table 11 and the locations of works are shown on Map 9.

Table 11: Proposed capital improvement works for North Moor and Salt Moor

Ref	Description of the proposed capital works for Kings Sedgemoor SSSI	Grid ref	Action by	Date
1.1	**Bankland Sluice S01 –** replace undershot sluice door with tilting weir to improve level control south of Banklands Drove.	ST 3234 2970	IDB	2010
1.2	**Lyng Corner penning bay S08 –** replace penning board structure with tilting weir to improve level control south of Bankland Drove and east of Lyng Drove.	ST 3327 3000	IDB	2010
1.3	Two culverts under Bankland Drove with weir penstocks for irrigation supply to **Philpot's Rhyne (S05)** and **Phillip's Rhyne (S06)** from Blankland's Rhyne and to maintain levels south of Bankland's Drove.	ST 3273 2975 ST 3308 2991	IDB	2010
1.4	**Lyng Bridge S09 –** replace existing bund with tilting weir for irrigation supply to Coates Rhyne and to maintain levels south of Bankland Drove and east of Lyng Drove.	ST 3346 3003	IDB	2010
2.1	**Philpot's Rhyne Penning Bay** - replace penning board structure with tilting weir to improve level control to the east of the Main Drain.	ST 3240 3008	IDB	2011
2.2	Renew access gateways on Hector's Lane Rhyne, Hutching's Rhyne, New Rhyne, North Moor Main Drain (upstream of Bankland Bridge), Cular Rhyne, Coats Rhyne, Engine Rhyne, Lyng Drove and Middlemoor Drove.	Various	IDB	2011-2012
2.3	**West Yeo Rhyne S10** – construct new tilting weir to maintain levels to the east of Lyng Drove.	ST 3313 3078	IDB	2011
2.4	**West Yeo Rhyne S03** – construct new tilting weir to maintain levels to the east of the Main Drain.	ST 3248 3106	IDB	2011
2.5	**Coat's Rhyne S11** – (north of Middlemoor Drove) **–** construct new tilting weir to maintain levels to the east of Lyng Drove and to the south of Middlemoor Drove.	ST 3337 3106	IDB	2011
2.6	**Phillip's Rhyne S07** – construct new tilting weir to maintain levels to the south of the structure.	ST 3301 3035	IDB	2011
2.7	**Middlemoor Rhyne S04 –** construct new tilting to maintain levels to the east of Lyng Drove and to the south of Middlemoor Drove.	ST 3251 3160	IDB	2011
2.8	**Cular Rhyne S12** – construct new tilting weir to maintain levels to the west of Ten Acre Drove.	ST 3393 2976	IDB	2011
2.9	**Horlake Tilting Weir S14** – Lower concrete cill and replace penstock with Tilting weir.	ST 3361 3177	IDB	2011
2.10	**Elson's Clyse Penning Bay** – replace undershot sluice door with tilting weir and box culvert to improve level control in Park Brook and for safe access to structure.	ST 3315 3301	IDB	2011
3.1	**Middlemoor Drove Rhyne** – access culverts and isolation bunds to form new viewed rhyne north of Middlemoor Drove and east of Main Drain.	Various	IDB	2012
3.2	**Engine Drove S13** – construction of tilting weir on Salt Moor Main Drain to provide independent level control for SSSI land to the south of Engine Drove.	ST 3502 3052	IDB	2012

Proposal 4: Additional gauge boards and telemetry stations will be installed by the Parrett IDB in the Plan area.

Reason: To improve its ability to manage water levels in the North Moor and Salt Moor area, the Parrett IDB proposes to install remote monitoring equipment and additional gauge boards at the locations set out in Table 12. Alarm settings will be established for each station, which will report directly to the Drainage Board Office. Stations may also be used to collect other relevant data such as rainfall or water quality information.

The Environment Agency has replaced gauge boards within the Plan area over the last few years. The Environment Agency has no plans to install any new telemetry sites within the Plan area, though existing telemetry is regularly assessed and upgraded as deemed necessary for optimum management capability.

Table 12: Proposed additional gauge boards and telemetry stations for North Moor and Salt Moor

Location	Grid Ref.	Notes	Operator
Banklands Bridge	ST 323297	u/d stream telemetry	IDB
Philpott's Rhyne	ST 324300	Gauge board	IDB
West Yeo Rhyne	ST 324307	Gauge board	IDB
Kitch Drove	ST 327323	Gauge board	IDB
Philpott's Rhyne	ST 327297	Gauge board	IDB
Phillip's Rhyne	ST 330306	Gauge board	IDB
Lyng Bridge	ST 332300	Gauge board	IDB
Coates Rhyne	ST 334300	Gauge board	IDB
West Yeo Rhyne	ST 331307	Gauge board	IDB
Phillip's Rhyne	ST 333310	Gauge board	IDB
Cular Rhyne	ST 339297	Gauge board	IDB
Salt Moor Main Drain	ST 350305	u/d stream telemetry	IDB
Elson's Clyse Penning Bay	ST 329332	Upstream telemetry	IDB

9.3. Changes to target water levels

Proposal 5: The Parrett IDB and the Environment Agency will adopt the proposed changes to target water levels, as set out in Table 13, and trial these levels to ensure they meet the agreed objectives.

Reason: Natural England has advised the Parrett IDB that some parts of North Moor SSSI require an increase in winter and spring water levels to provide a minimum depth of water in ditches for aquatic plants and invertebrates, and splashy fields in winter for wintering water birds and soft ground conditions in spring for breeding waders. The seasonal water levels at some of the control structures will therefore need to be changed to help achieve favourable condition for North Moor SSSI.

The proposed changes in target water levels are set out in Tables 13. The locations of the areas with seasonally higher water levels are shown on Map 10. The proposed improvements to the water control infrastructure, outlined in Proposals 3 and 4, will help the Parrett IDB and the Environment Agency to achieve, and maintain, the water levels required for favourable condition on the SSSI.

Table 13: Proposed target water levels in North Moor and Salt Moor

Water level control structures	Operated by	Existing summer water levels (m ODN)	Existing winter water levels (m ODN)	Proposed summer water levels (m ODN)	Proposed winter water levels (m ODN)
North Moor Pumping Station	EA	3.30	3.07	3.30	3.05
Salt Moor Pumping Station	EA	3.68	3.45	3.65	3.40
Banklands Bridge (S01)	IDB	~3.65	~3.10	3.60 [1]	3.40 [1]
Philpott's Rhyne Structure (S02)	IDB	~3.65	~3.20	3.40 [1]	3.20 [1]
Lyng Bridge Penning Bay (S08)	IDB	~3.70	~3.20	3.70 [1]	3.45 [1]
Elson's Clyse Penning Bay on Park Brook	IDB	Level unknown		[1]	[1]
Haymoor Rhyne Tilting Weir	IDB	Level unknown		[1]	[1]
S3 (RWLA)	EA	3.25	3.64	3.25	3.64
S4 (RWLA)	EA	3.25	3.54	3.25	3.54
West Yeo Rhyne (S03)	IDB	New structure		3.25 [1&2]	3.10 [1&2]
West Yeo Rhyne (S10)	IDB	New structure		3.25 [1&2]	3.20 [1&2]
Philpott's Rhyne Feed (S05)	IDB	New structure		3.60 [1]	3.40 [1]
Phillip's Rhyne Feed (S06)	IDB	New structure		3.60 [1]	3.40 [1]
Phillip's Rhyne (S07)	IDB	New structure		3.40 [1&2]	3.20 [1&2]
Middlemoor Rhyne (S04)	IDB	New structure		3.30 [1]	3.10 [1]
Phillip's Rhyne (S11)	IDB	New structure		3.30 [1]	3.20 [1]
Lyng Bridge Penning Bay (S08)	IDB	New structure		3.70 [1]	3.45 [1]
Coates Rhyne (S09)	IDB	New structure		3.70 [1]	3.45 [1]
Cular Rhyne (S12)	IDB	New structure		3.70 [1]	3.45 [1]
Salt Moor Main Drain (S13) [3]	IDB	New structure		3.70 [1]	3.45 [1]
Horlake Tilting Weir (S14)	IDB	New structure		3.30 [1]	3.10 [1]

Notes:
- **Summer season:** Aim to achieve summer pen levels by 1st April.
- **Winter season:** Aim to achieve winter pen levels by 1st December.
- See Box 2 (page 26) for target conditions for RWLAs.
- **[1]:** Level subject to trial.
- **[2]:** Potential RWLA structure for land between the North Moor Main Drain and Lyng Drove (potential winter level = 3.50m to3.60m).
- **[3]:** Construction and operation of S13 could secure water levels within the SSSI to the south of Engine Drove and a slightly lower water level could be set at Salt Moor Pumping Station for the land to the north (potential level at Salt Moor PS; summer = 3.60 and winter = 3.35m).
- **[~]** approximate water level.
- **ODN:** Ordnance Datum Newlyn.

Proposal 6: The Parrett IDB will support the management of Raised Water Level Areas in the Plan area, as set out in Table 14.

Reason: Within the framework provided by the operation of the arterial watercourses and control structures, the Parrett IDB will support the management of RWLAs in the Plan area, where they do not adversely affect the management of neighbouring land. Where conflict does occur, the IDB will work with landowners to achieve the best water management solution.

The Parrett IDB acknowledges that there may be the potential to increase the area managed with raised water levels in winter and / or the spring within the Plan area. The Parrett IDB would support Natural England in their work to secure the appropriate agri-environment agreements to increase the area managed for breeding waders during the five years of this WLMP. The improvements to the water management infrastructure in this Plan would support, and not prejudice, the realisation of these opportunities in future years.

The areas with seasonally higher water levels are set out in Table 14 and their locations are shown on Map 10.

Table 14: Proposed target water levels for RWLAs in North Moor and Salt Moor

Structure	Target conditions – winter and spring	Existing summer water levels (m ODN)	Existing winter water levels (m ODN)	Proposed summer water levels (m ODN)	Proposed winter water levels (m ODN)
North Moor Corner RWLA Block 1	Winter splash and spring splash	3.34	3.64	3.34	3.64
North Moor Corner RWLA Block 2	Winter splash and spring splash	3.30	3.54	3.30	3.54
Mr Knight (Salt Moor)	Winter splash	1.68	1.75 [1]	1.70	1.75 [1]
Mr Gillard (Salt Moor)	Winter splash	1.68	1.75 [1]	1.68	1.75 [1]
Mr Hector (Salt Moor)	Winter splash	1.70	1.80 [1]	1.70	1.80 [1]
Potential Middlemoor Block	Winter splash and spring splash	3.30	3.07	3.30	3.40-3.50 [1]

Notes: - See Box 2 (page 26) for target conditions for RWLAs.

9.4. Changes to operational procedures and responsibilities

Proposal 7: The Parrett IDB and the Environment Agency will adopt a flexible operating regime that allows water levels and seasonal penning dates to vary in response to weather conditions.

Reason: The Parrett IDB considers that flexibility is a critical element in the management of water across the Somerset Levels and Moors. The timing of operations (e.g. setting pen levels, watercourse maintenance) and the water levels need to be responsive to the prevailing weather conditions at the time.

The Parrett IDB and the Environment Agency propose to adopt the following principles for establishing operating guidelines for key water management structures:

- The timing of the normal seasonal changes in pen level can vary by up to two weeks from the date specified in the Plan;
- The normal water level can range up to 50 mm above the level specified in the Plan during dry conditions;
- The normal water level can range up to 100 mm below the level specified in the Plan during wet conditions.

The Environment Agency and the Parrett IDB have also agreed to meet three weeks before the normal changeover date to confirm summer/winter penning dates based on catchment conditions. If the catchment conditions require the Parrett IDB or the Environment Agency to operate outside these guidelines then consultation with Natural England will take place.

Tables 15 and 16 set out the trial operating guidelines for the North Moor and Salt Moor Pumping Stations.

Table 15: Operating guidance for North Moor Pumping Station

Flow conditions	Level Regime	Control mechanism	Target drain level (DV)	Maximum drain level	Notes
Summer (1 Apr – 1 Dec)					
Extended dry	Stable	Gravity	3.35	3.38	
Base flow	Stable / Variable	Gravity / Electric pump	3.30	3.35	
Wet (+ flood recovery)	Variable	Electric pump	3.20 - 3.25	3.30	
Flood	Variable	Diesel pumps	Pumping as required	Pumping as required	
Winter (1 Dec – 1 Apr)					
Extended dry	Stable	Gravity	3.10	3.70	
Base flow	Variable	Electric pump	3.05	3.10	
Wet (+ flood recovery)	Variable	Electric pump	2.95 – 3.00	3.05	
Flood	Variable	Diesel pumps	Pumping as required	Pumping as required	

Table 16: Operating guidance for Salt Moor Pumping Station

Flow conditions	Level Regime	Control mechanism	Target drain level (DV)	Maximum drain level	Notes
Summer (1 Apr – 1 Dec)					
Extended dry	Stable / Variable	Gravity / Electric pump	3.68	3.72	
Base flow	Variable	Electric pump	3.65	3.68	
Wet (+ flood recovery)	Variable	Electric pump	3.55 – 3.60	3.65	
Flood	Variable	Diesel pumps	Pumping as required	Pumping as required	
Winter (1 Dec – 1 Apr)					
Extended dry	Stable	Gravity	3.45	3.50	
Base flow	Stable / Variable	Electric pump	3.40	3.45	
Wet (+ flood recovery)	Variable	Electric pump	3.35 – 3.40	3.45	
Flood	Variable	Diesel pumps	Pumping as required	Pumping as required	

Proposal 8: The Parrett IDB and the Environment Agency will agree the criteria for the use of the diesel pumps at North Moor and Salt Moor Pumping Stations in flood events.

Reason: The Environment Agency and the Parrett IDB will seek to agree and implement a protocol for the operation of the diesel pumps at North Moor and Salt Moor Pumping Stations in flood events. It is suggested by the Parrett IDB that the criteria for using the diesel pumps in flood events should include:

North Moor

Any of the following:

- Failure of one electric pump in a flood event
- When Athelney spillway is running.
- Main drain level at Middlemoor Bridge reaching 3.50m ODN and rising.

Salt Moor

Any of the following:

- Failure of one electric pump in a flood event.
- When Athelney spillway is running.
- Main drain level at the Cular Rhyne reaching 3.80m ODN and rising.

Proposal 9: The Parrett IDB, the Environment Agency and Natural England will establish and maintain a monitoring programme to support the implementation of the Plan and to ensure that water level management meets the agreed objectives.

Reason: Changes in water levels and operational practices will be monitored by the relevant authorities and assessed to determine their effects on conservation, agriculture and flood risk management. The Parrett IDB will report on the outcomes of this monitoring, at least once a year, for three years following the implementation of the Plan.

Several organisations are involved in monitoring environmental information that is relevant to the WLMP, as set out in Table 17.

Table 17: Monitoring arrangements for North Moor and Salt Moor

Lead body	Topic of monitoring
Parrett IDB	• Target water levels at key IDB control structures; • Maintenance of Viewed Rhynes; • Monitoring channel profiles and conveyance in Viewed Rhynes; • Maintenance of minor watercourses, farmers ditches etc; • Water quality.
Environment Agency	• Target water levels at key Agency control structures; • Maintenance of Main Rivers; • Monitoring channel profiles and conveyance in Main Rivers; • Catchment rainfall and weather events; • Water quality.
Natural England	• Plant, bird, invertebrate and mammal communities; • Land management; • Surface water and soil wetness conditions; • Water quality.

It is anticipated that an ongoing monitoring programme of long-term changes in the plant, bird, invertebrate and mammal communities of the North Moor and Salt Moor area will be undertaken by Natural England and others. The data collected will be used in combination with Environment Agency and Parrett IDB environmental data, and local knowledge, to inform and refine decisions regarding suitable water levels in the future.

Proposal 10: The Parrett IDB and the Environment Agency will resolve the proposed changes in ownership and responsibility of selected water control structures and watercourses in the Plan area.

Reason: There are merits to having one Operating Authority manage a greater proportion of the smaller structures that control water levels within a defined system. The Environment Agency and the Parrett IDB are negotiating the handover of maintenance and operational responsibility for some of the control structures currently maintained and operated by the Environment Agency.

DEFRA and Government priorities, with regards to flood risk management, have been evolving over the past few years. This has resulted in the Environment Agency having to review its priorities and activities. The Environment Agency currently maintains and operates many structures that provide essential land drainage and nature conservation benefits. It also manages and maintains Main Rivers that serve no critical flood defence benefit. In the future the Environment Agency may no longer be able to justify maintaining or operating these structures

and watercourses. The Environment Agency may consider de-maining some watercourses on this basis in the future.

One possible option is for the Parrett IDB to take over the ownership and management of these watercourses and structures, to continue a system of professional management and to provide continuity for the benefit of land owners and wildlife.

9.5. Changes to maintenance practices

Proposal 11: The Parrett IDB will complete a review of IDB watercourses maintenance procedures in the Plan area.

Reason: In consultation with ratepayers and Natural England, the Parrett IDB will complete a review of the Board's procedures for maintaining Viewed Rhynes and non-arterial watercourses within Plan area. The Parrett IDB will also establish a de-silting programme for Viewed Rhynes in order to benefit water circulation and to restore and enhance ditch habitats in areas affected by silt accumulation. High silt levels and shallow water depths can reduce water flows, increase water temperatures in summer and adversely affect ditch habitat quality and availability. The IDB will inform Natural England of any changes to maintenance procedures that may affect the SSSI.

Proposal 12: The Environment Agency will complete its review of the maintenance of Main Rivers within and adjacent to the Plan area.

Reasons: The Environment Agency is currently investigating the effectiveness of silt removal from a number of Main Rivers and Drains in the Parrett IDB District including, the Rivers Parrett and Tone, North Moor Main Drain and West Sedgemoor Main Drain. The Environment Agency will use the findings of these investigations to help determine the need for a programme of de-silting.

10. Unresolved matters

10.1. Climate change impacts

The potential effects of climate change and sea level rise on the Plan area are unclear at present. Current studies by the Environment Agency, and others, should inform the Parrett IDB on these matters and the mitigation or adaptation required in water management to accommodate these impacts.

The Government has recently introduced the Carbon Reduction Commitment, which the Environment Agency and other public sector organisations must comply with. The Environment Agency has set itself a target of 33% carbon reduction by 2015. Therefore, water level management needs to be carried out with the minimum of CO_2 output. The Drainage Board will work with the Environment Agency to identify opportunities, such as maximising gravity discharge, and investigate the potential impacts of such measures on flood risk management and the environment.

10.2. Mr & Mrs John, Willow House, Lyng

Mr & Mrs John are concerned that the proposed changes in water levels will increase flood risk to their property on Hectors Lane (Lyng). The Board's Engineers have met with Mr & Mrs John and will investigate the issue in greater detail. The property has flooded in recent years and appears to be vulnerable to surface water runoff from the village and inadequate drainage along Hectors Lane, which may be causing localised flooding around the property. No changes to water levels will be made in this part of the moor until this issues has been investigated and resolved.

11. Amendments agreed during the period of the Plan

Amendments to this Plan which are agreed by Drainage Board, the Environment Agency and Natural England are set out in Table 17.

Table 17: Amendments agreed during the period of the Plan

No.	Date	Amendment	Agreed

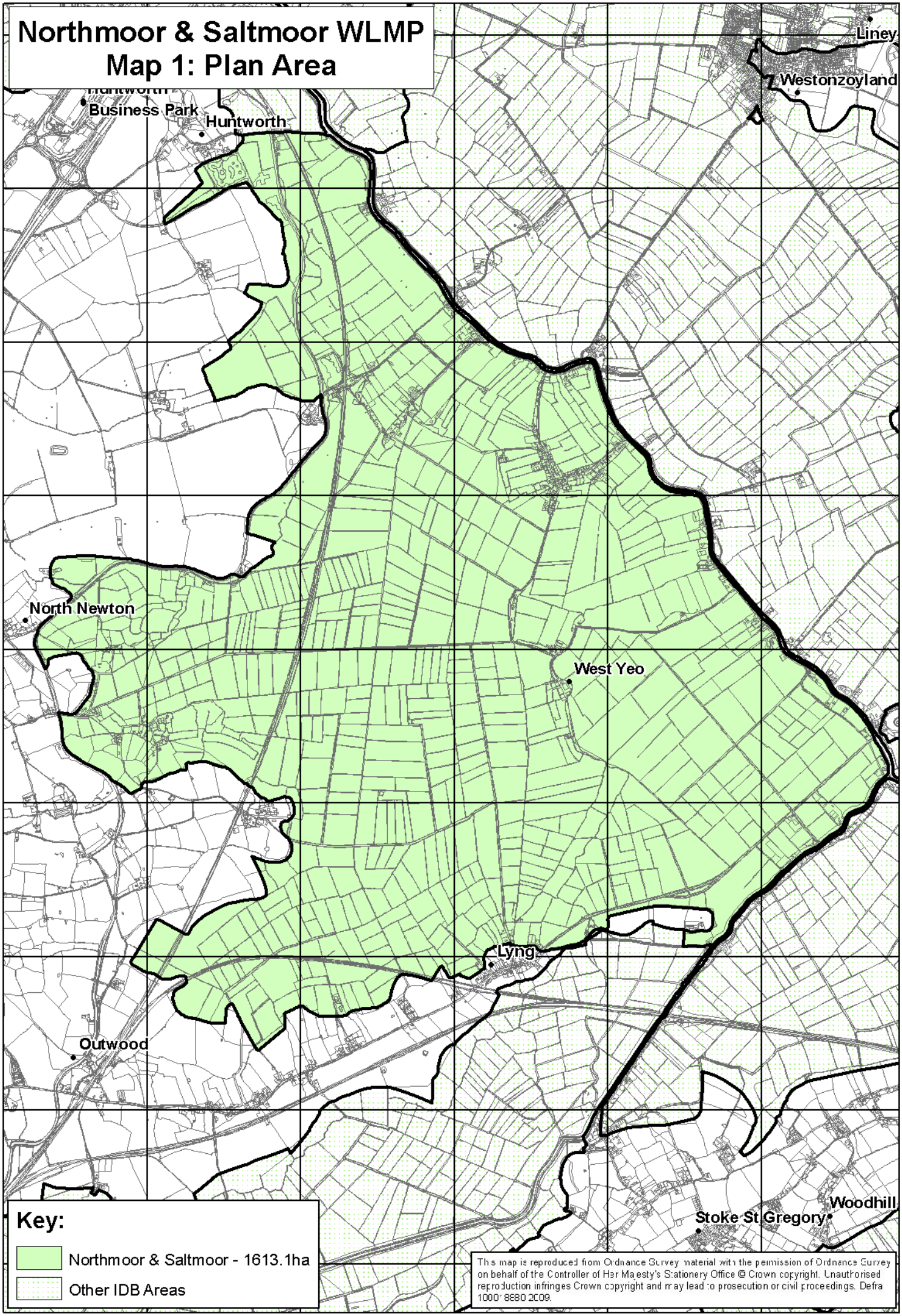
12. Review arrangements

The Parrett IDB proposes to review this WLMP in 2015, five years after it has been adopted. If any alterations to operating procedures or maintenance are required before 2015, these will be discussed by the IDB, the Environment Agency and Natural England and can agreed as interim measures pending the full review.

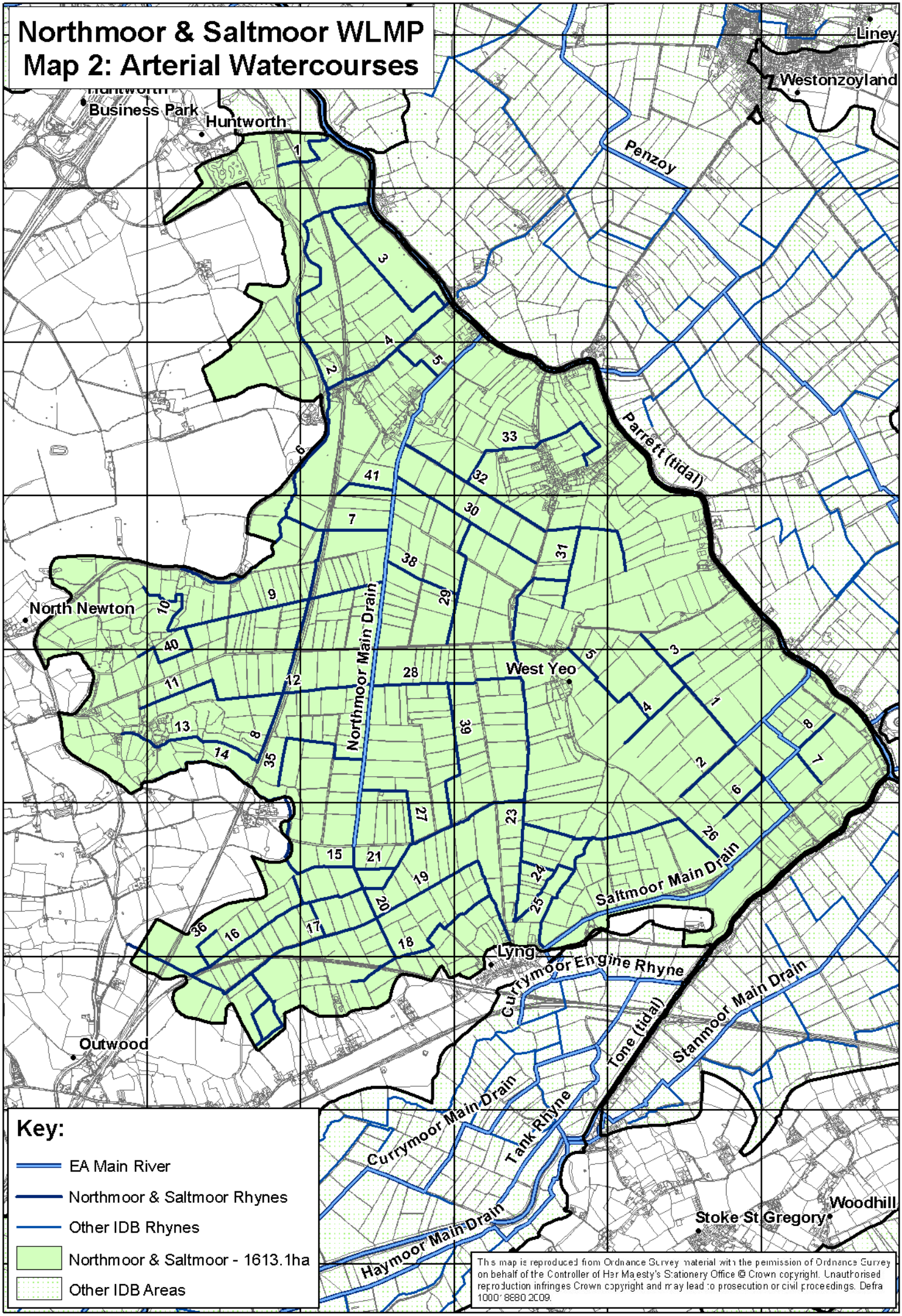
13. Timetable of actions: North Moor and Salt Moor 2010 WLMP

	Proposed continuation of current good practice	
1:	The current summer and winter penning levels at the key control structures, as set out in Table 13, will continue to be maintained by the Parrett IDB and the Environment Agency.	**Ongoing**
2:	Maintenance of the current Viewed Rhyne network will continue to be undertaken by the Parrett IDB.	**Ongoing**
	Proposed changes to water control infrastructure	
3:	Capital improvement works will be carried out by the Parrett IDB to help achieve favourable condition on North Moor SSSI.	**Complete by end 2014**
4:	Additional gauge boards and telemetry stations will be installed by the Parrett IDB in the Plan area.	**Complete by end 2012**
	Proposed changes to target water levels	
5:	The Parrett IDB and the Environment Agency will adopt the proposed changes to target water levels, as set out in Table 13, and trial these levels to ensure they meet the agreed objectives.	**From 2010**
6:	The Parrett IDB will support the management of Raised Water Level Areas in the Plan area, as set out in Table 14.	**Ongoing**
	Proposed changes to operational procedures and responsibilities	
7:	The Parrett IDB and the Environment Agency will adopt a flexible operating regime that allows water levels and seasonal penning dates to vary in response to weather conditions.	**From 2010**
8:	The Parrett IDB and the Environment Agency will agree criteria for the use of the diesel pumps at North Moor and Salt Moor Pumping Stations in flood events.	**Winter 2010**
9:	The Parrett IDB, the Environment Agency and Natural England will establish and maintain a monitoring programme to support the implementation of the Plan and to ensure that water level management meets the agreed objectives.	**Establish winter 2010**
10:	The Parrett IDB and the Environment Agency will resolve the proposed changes in ownership and responsibility of selected water control structures and watercourses in the Plan area.	**Complete by end 2012**
	Proposed changes to maintenance practices	
11:	The Parrett IDB will complete a review of IDB watercourses maintenance procedures in the Plan area.	**Complete by 2012**
12:	The Environment Agency will complete its review of the maintenance of Main Rivers within and adjacent to the Plan area.	**Complete by end 2011**

Northmoor & Saltmoor WLMP
Map 1: Plan Area

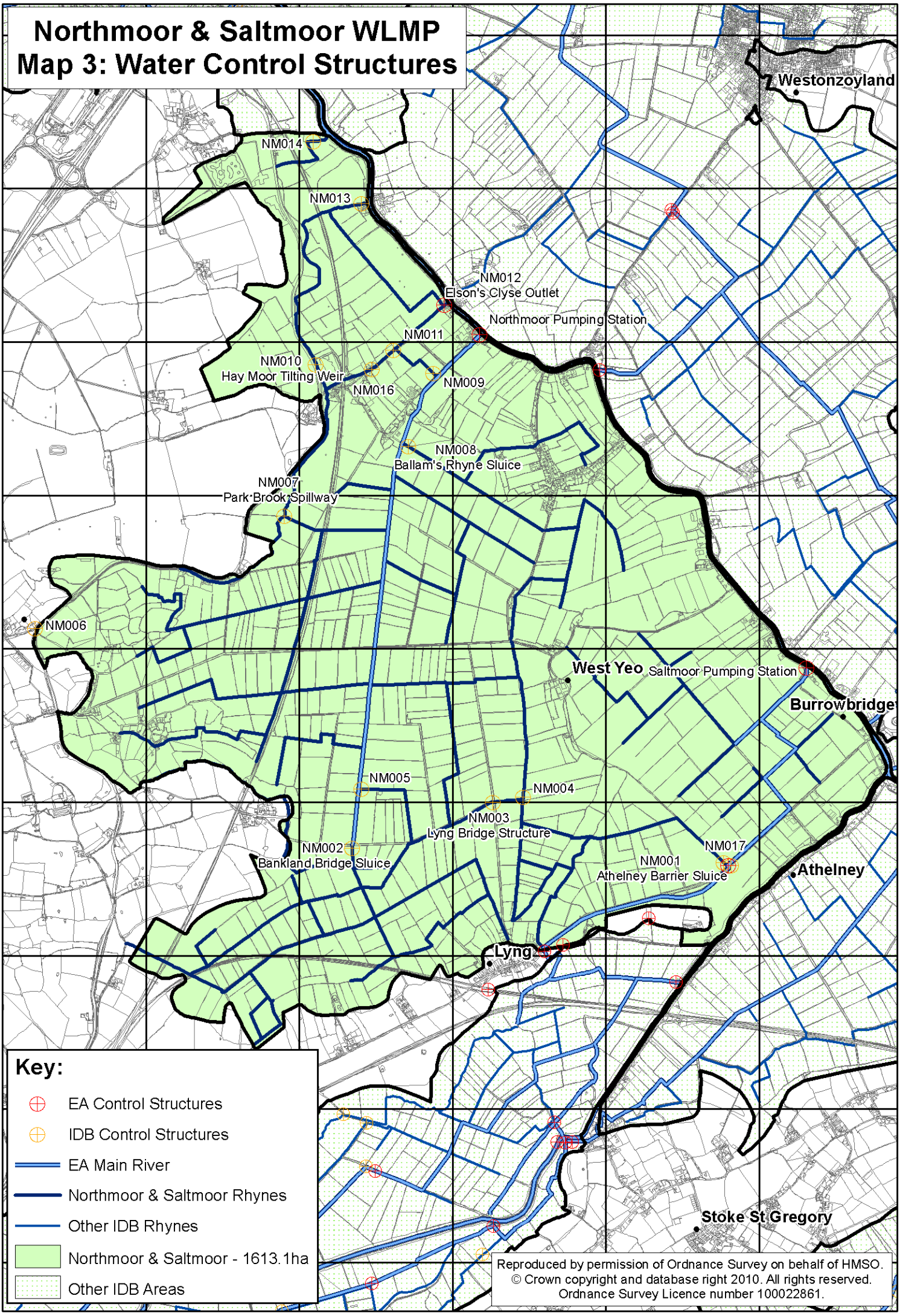


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Northmoor & Saltmoor WLMP
Map 3: Water Control Structures

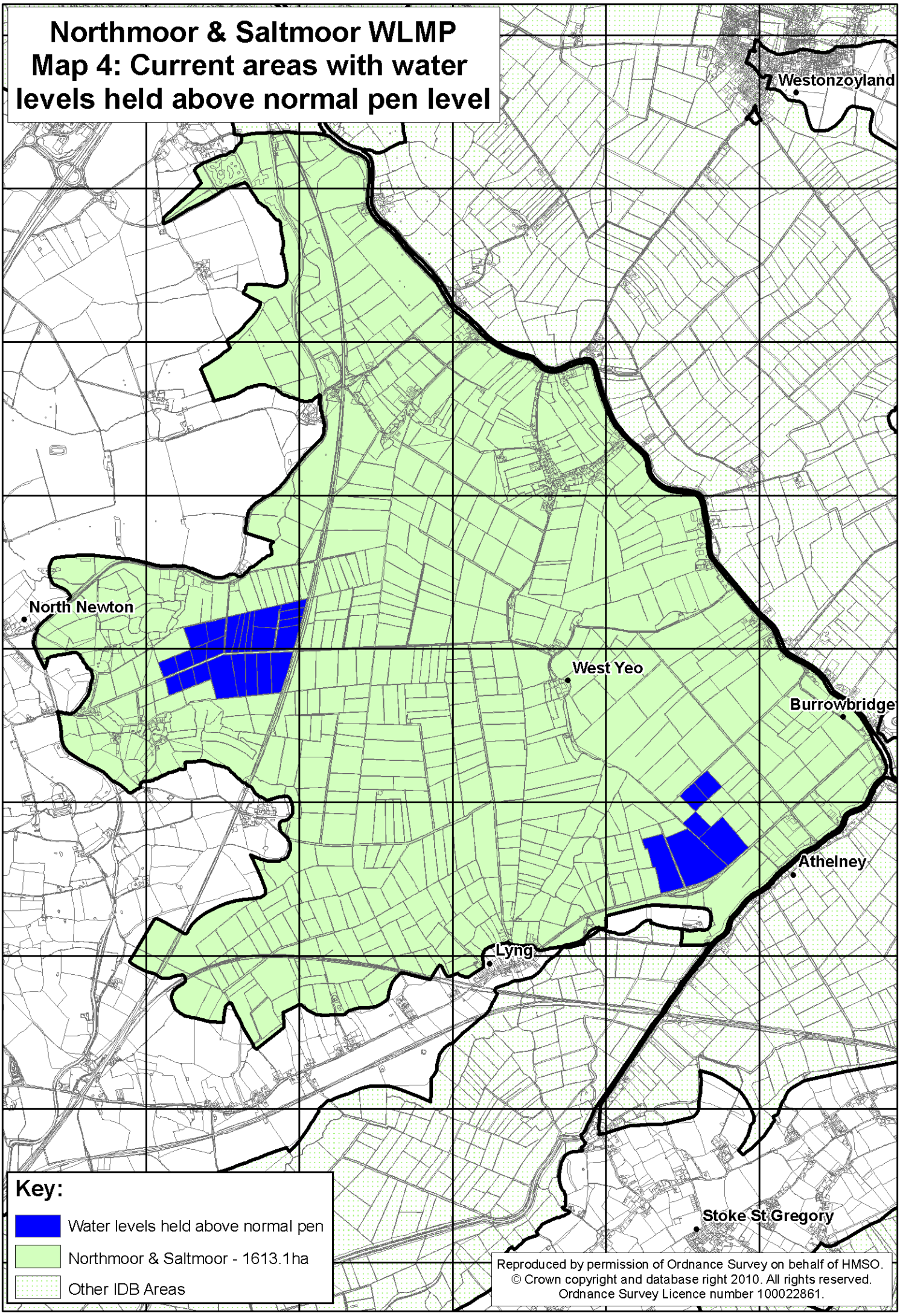


Key:

- EA Control Structures
- IDB Control Structures
- EA Main River
- Northmoor & Saltmoor Rhynes
- Other IDB Rhynes
- Northmoor & Saltmoor - 1613.1ha
- Other IDB Areas

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Northmoor & Saltmoor WLMP
Map 4: Current areas with water levels held above normal pen level

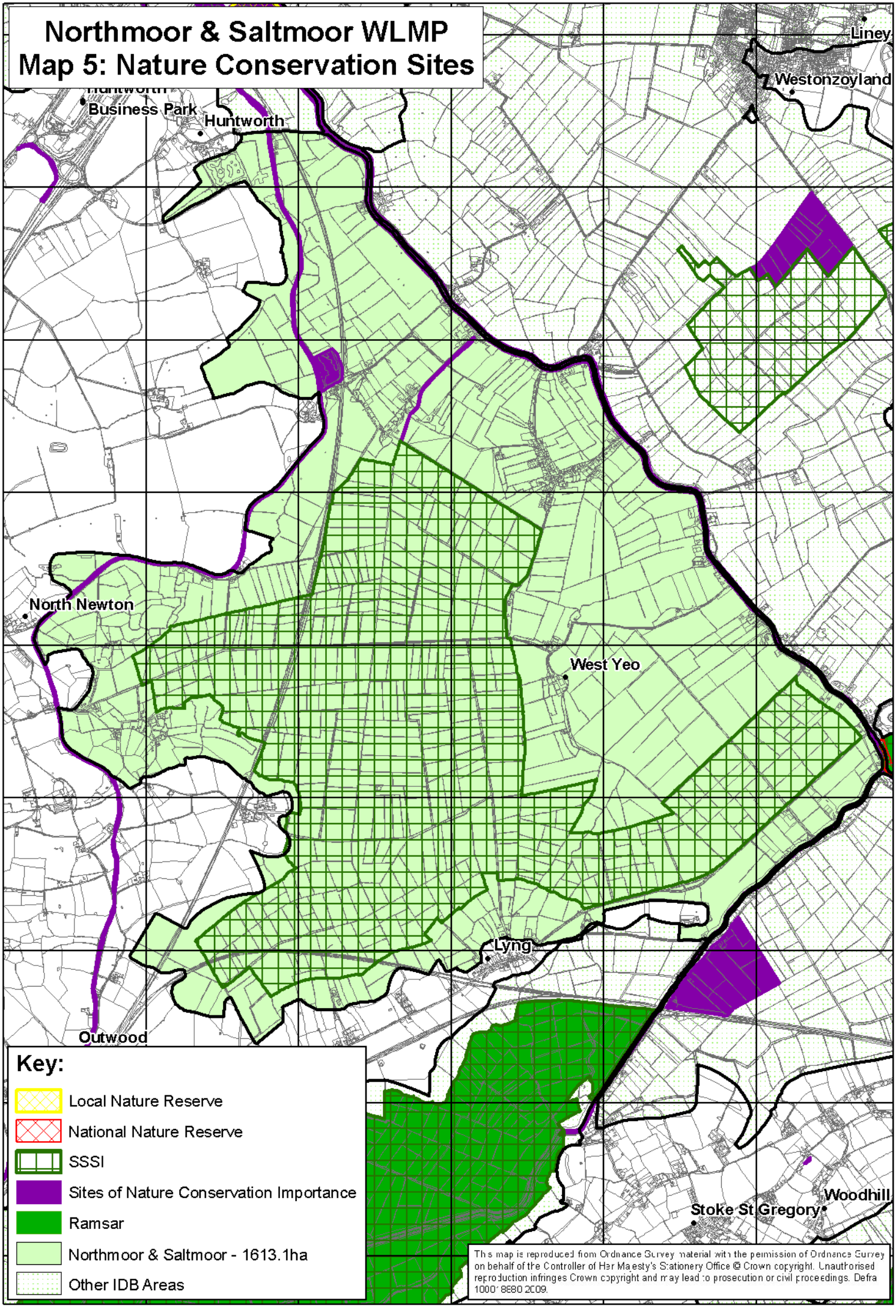


Key:

- Water levels held above normal pen
- Northmoor & Saltmoor - 1613.1ha
- Other IDB Areas

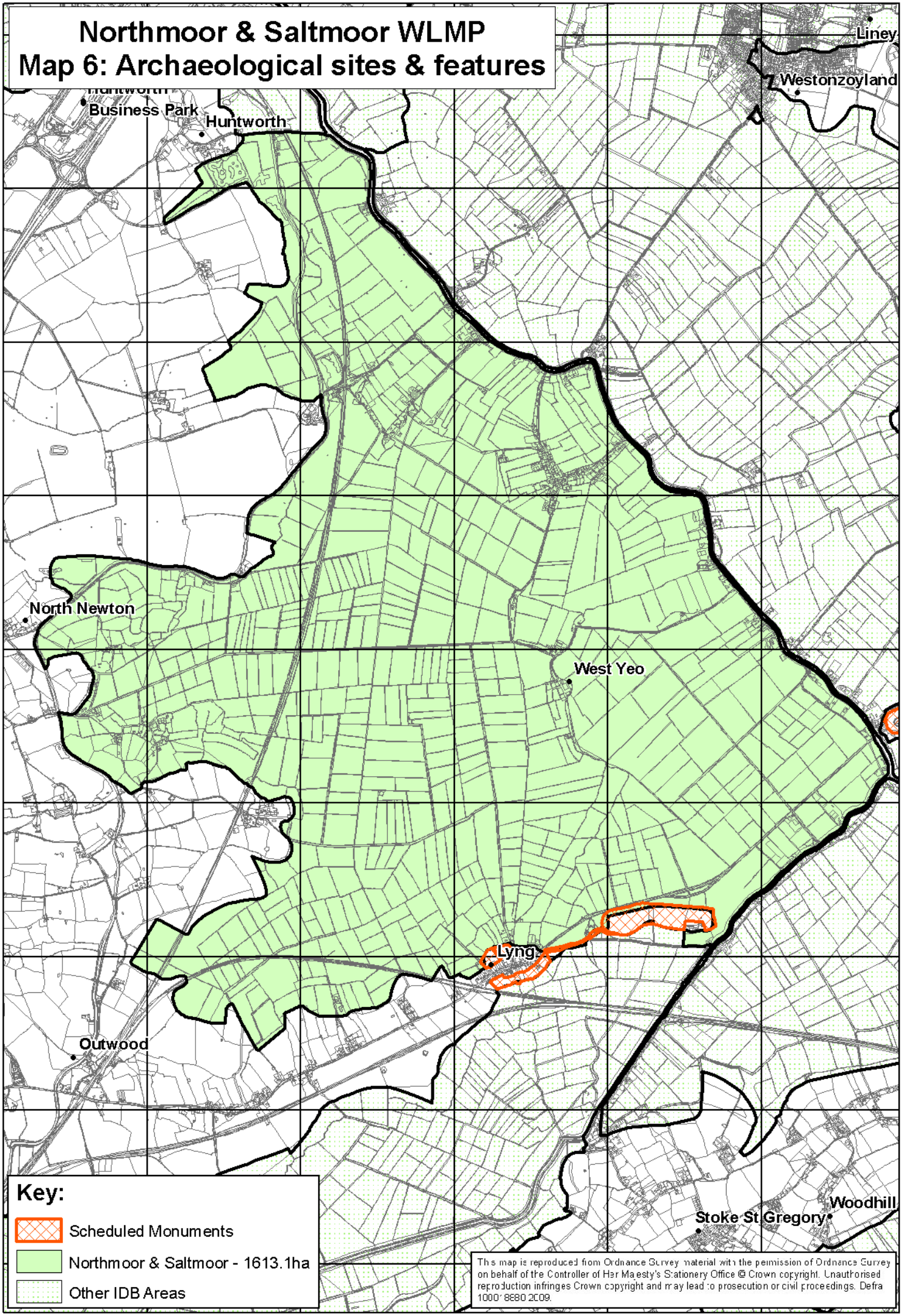
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Northmoor & Saltmoor WLMP
Map 5: Nature Conservation Sites



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Northmoor & Saltmoor WLMP
Map 6: Archaeological sites & features

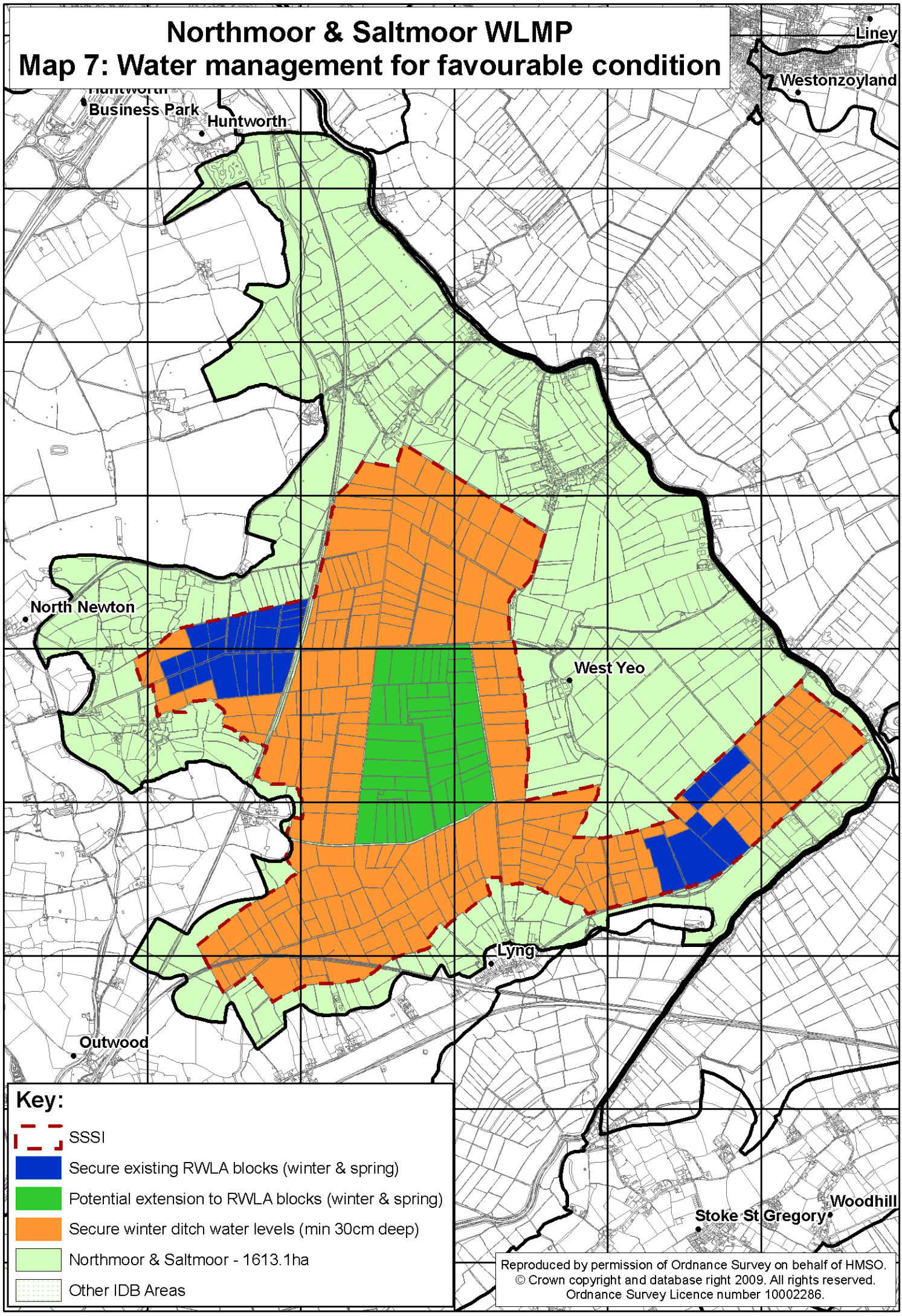


Key:

- Scheduled Monuments
- Northmoor & Saltmoor - 1613.1ha
- Other IDB Areas

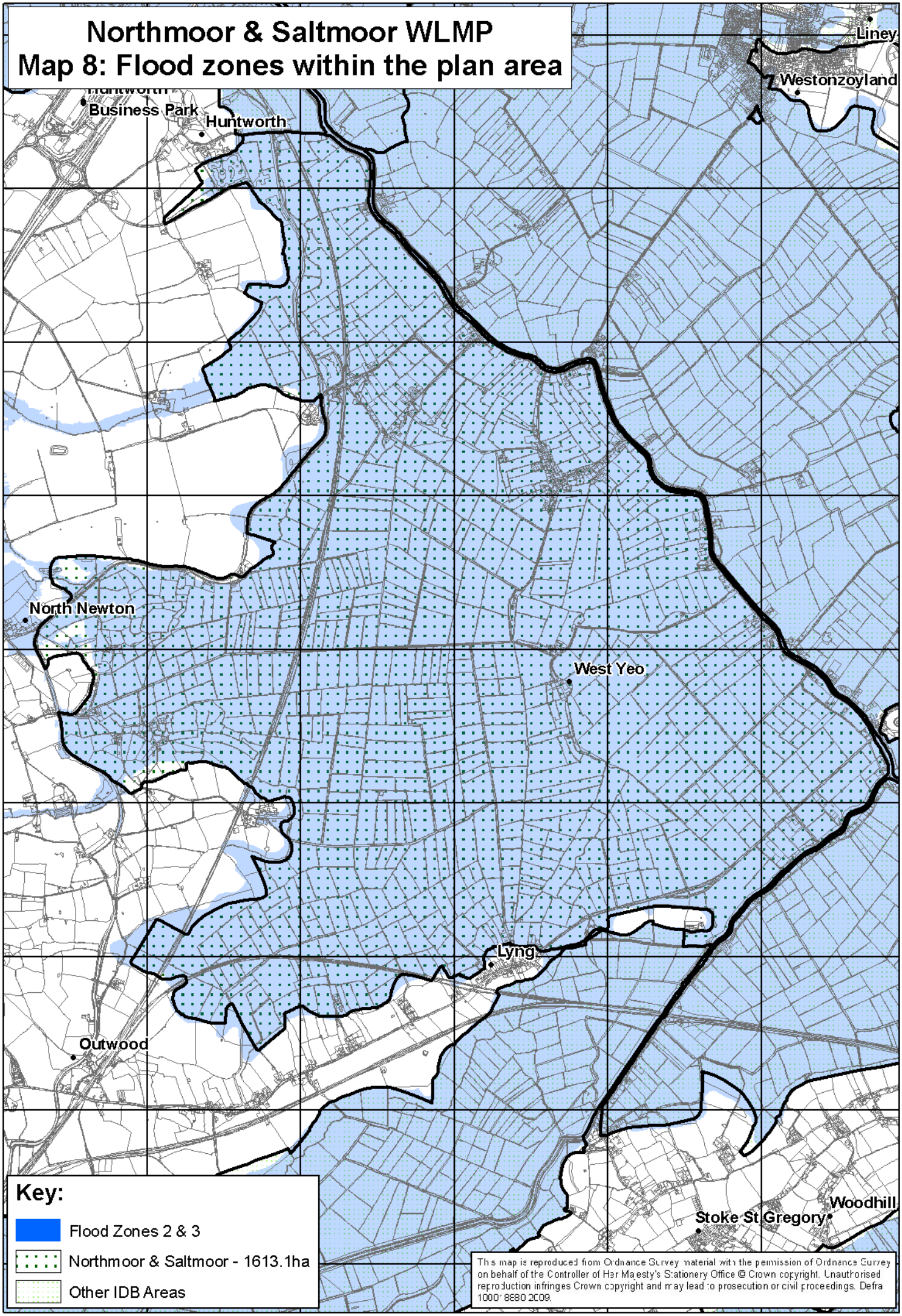
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Northmoor & Saltmoor WLMP
Map 7: Water management for favourable condition

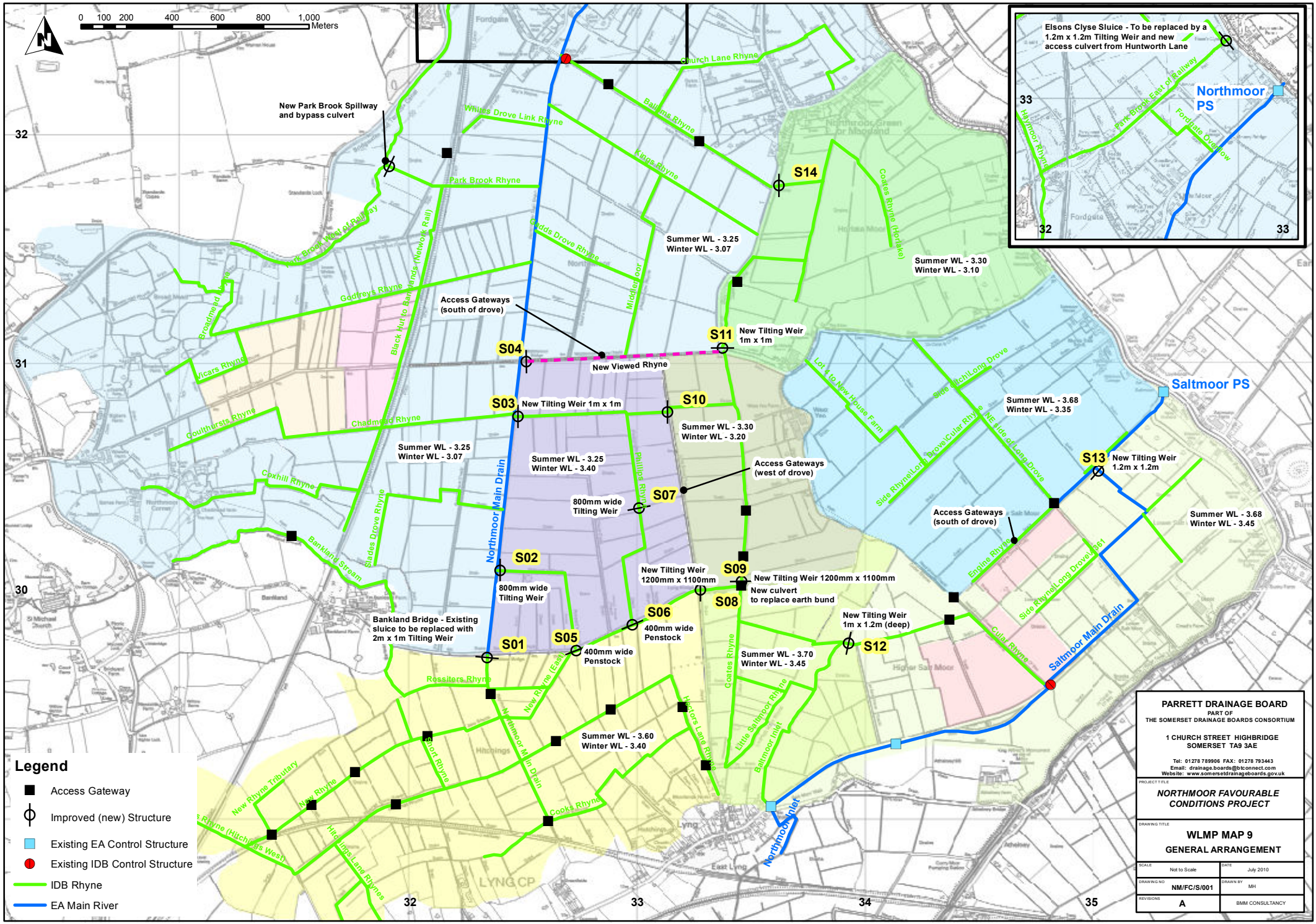


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Northmoor & Saltmoor WLMP
Map 8: Flood zones within the plan area

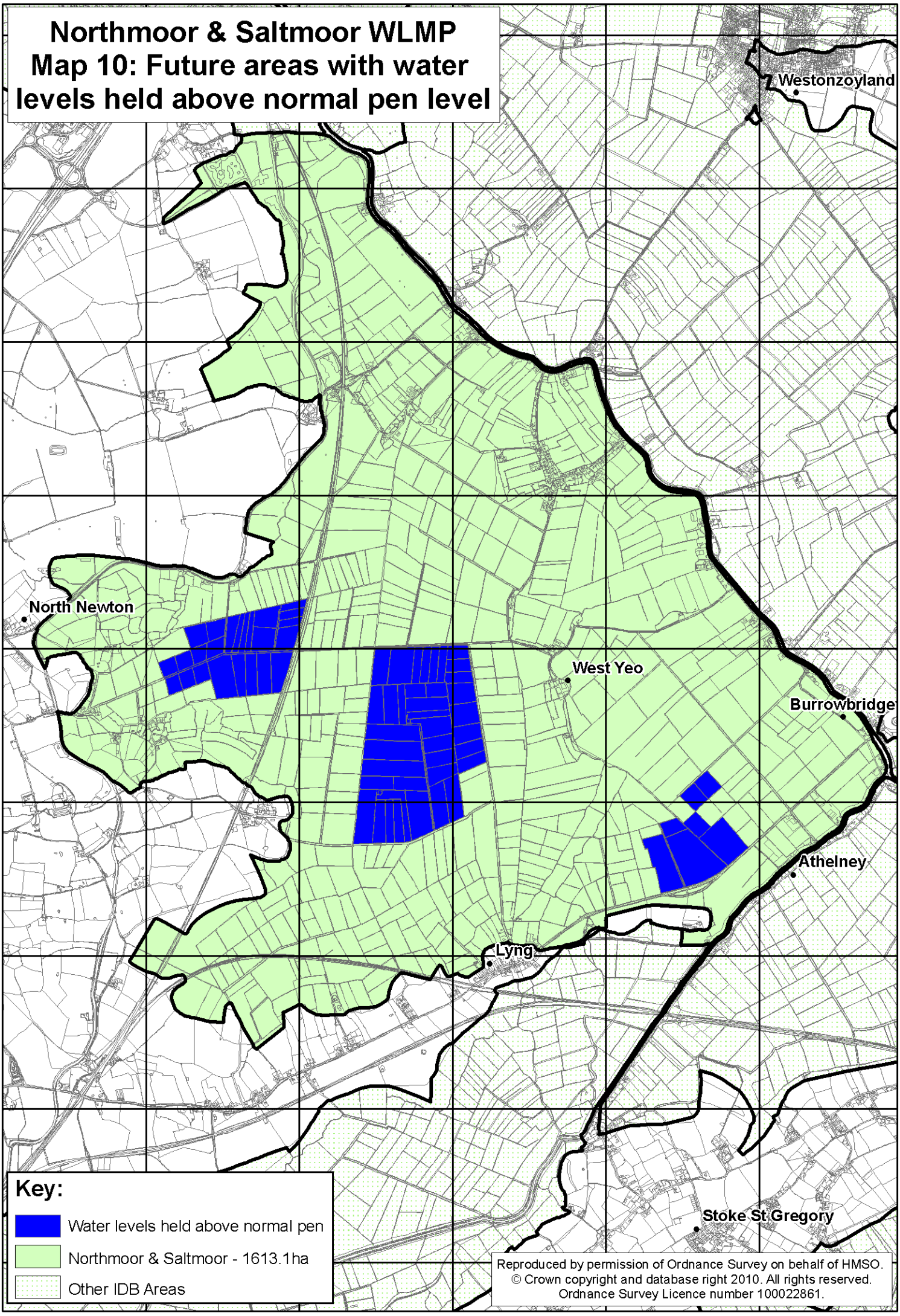


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Northmoor & Saltmoor WLMP
Map 10: Future areas with water levels held above normal pen level



Key:

- Water levels held above normal pen
- Northmoor & Saltmoor - 1613.1ha
- Other IDB Areas

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